HOME DOCTORING OF ANIMALS

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HOME DOCTORING

OF

ANIMALS.

(REVISED AND ENLARGED.)

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PREFACE TO NEW AND REVISED EDITION.

Many editions of this work have been called for and the author has had the gratification of learning of its utility, and of a greater sale perhaps than any other book of its kind.

During the war years, the last copy was sold, and it could not be reproduced, owing to paper difficulties and the fact that I was serving in the Royal Army Veterinary Corps through the whole period of hostilities.

In order to incorporate experience since acquired, it was decided to revise and bring the work up to date.

I take this opportunity of apologising to the numerous County Council Classes to whom I have since lectured, for the delay in bringing out the revised work, and thank them for the wide appreciation they have shewn of previous editions.

HAROLD LEENEY.

April, 1921.

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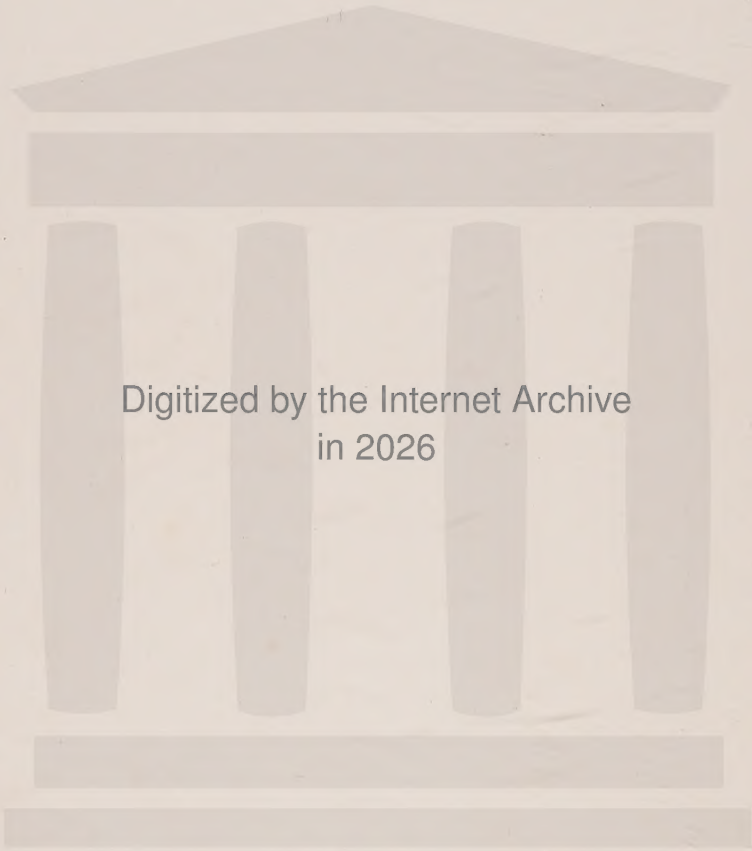
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Chapter I.

DISEASES OF THE BLOOD—SPECIFIC DISEASES.

ANTHRAX.

Anthrax is a disease of the blood, caused by a so-called specific bacillus (Bacillus anthracis), and can arise from no other cause. There are circumstances in which sour fermented food, as horse "chop" which has become stale, has been strongly suspected of giving rise to anthrax, but with our present knowledge we can only suppose that the bacilli have been made active, not created, by such chemical changes.

By inoculation the disease can be communicated from one animal to another and from one species to another. Cattle, sheep, pigs, and horses are the most frequent subjects, and in the order given here. The disease may be taken in the form of spores, or bacilli, in the drinking water, or upon the food, and, it is supposed by inhalation, and through abrasions of the skin.

Anthrax attacks in several different forms, but the presence of the bacilli in the blood removes all doubt as to its nature.

There is a form of it in cattle known as glossanthrax, the tongue being the chief organ affected, or the disease being localised specially there. All herbivorous animals are liable to this form. In the horse and pig, the pharynx and respiratory passages are attacked, and the intestines occasionally.

The most sudden and violent form is that formerly called splenic apoplexy, which comes on so suddenly that an apparently healthy cow, while being milked, will stagger and fall upon the milker, unless he is quick to get out of the way. This has been said to be an exaggeration, but I happen to have seen it myself in a famous shorthorn herd which became affected by the spreading of London manure containing tannery refuse from skins imported from Argentina, where anthrax was rife. Adult cattle and sheep are prone to this more than the young, while comparatively immune to some anthracoid affections such as quarter-ill (*see* Black Leg).

Symptoms.—These necessarily vary according to the nature of the attack, whether affecting the tongue, respiratory organs, intestines, or spleen in particular. The one common symptom is that of shock, high temperature, cold extremities, quick shallow breathing, and a deadly depression. All of these symptoms may escape observation, and very frequently do, and the first intimation of anything amiss is the finding of one or more animals already dead. The cows referred to previously, began to roll in the stall, then purged blood, and fell, loudly bellowing, in almost as short a time as it takes to write these words. Some which were taken later lived a day or two, and in more than one, depression gave way to mania, the animals charging and falling dead. I have also seen this in fields where a grazing steer has suddenly left his companions and galloped furiously up to and through a hedge, only to fall dead on the other side. Sheep generally get away from the flock and stand still with drooping head and lop ears, until they sink to the ground and die; but a mad gallop is not unknown to precede death in their case. Reverting to the tongue cases, there is sudden and great swelling so that the animal cannot keep its mouth shut, the organ blackens and suffocation threatens, but in rare instances recovery takes place. This may be said possibly of all forms of anthrax, but is so extremely rare that very few experienced veterinary surgeons have ever seen it, and most of the so-called recoveries have never been proved, by blood examination, to have been genuine cases of anthrax.

The recognition of symptoms is of importance, although treatment is out of the question, the law very wisely prohibiting such animals to live and constitute a danger to others. We must diagnose it, or prove after death what was the matter, in order to deal wisely with the carcase, and the rest of the herd or flock. The carcase ought to be burned. Had this been practised for three or four generations we should have no anthrax that is not imported, and the latter we need not have if hide merchants, leather dressers, and wool workers were compelled to incinerate their waste. Everything in the way of refuse finds its way into the manure heap or the dusthole of great cities, and so we find animals poisoned by paint-pots which have been cast out with dried-up colour in them, and anthrax and other diseases communicated, which have a specific bacillus capable of living in the manure heaps and dustholes of a city until trained away into the country and afforded new opportunities of finding their natural habitat. Although the above causes have been clearly traced by the writer, among others, I would say without hesitation that the chief is a preventable one at home. We have buried our carcases superficially and the spores have been brought up again by earth worms and plants. Burial to a depth of six or seven feet is still officially recommended. Burning is even more troublesome where large carcases are concerned; but the latter is the only reliable method of disposal. No carcase, dead of anthrax, should have the skin cut, but be buried whole if not burned, and the grave fenced off. Premises in which affected animals have lived should be thoroughly disinfected.

Those who desire to cremate carcases often do not know how to set about it, and for such the directions given by General Sir Fred Smith in his "Veterinary Hygiene" will prove valuable. He says: "It is a costly process, but absolutely satisfactory, and is time-saving compared with the labour of digging deep trenches for the reception of bodies. Field cremation is easily carried out. Nothing is required but a trench dug in the ground in the shape of a +. Each trench is about 7 feet long, about 15 inches wide, and 18 inches deep at the centre, where the two meet, becoming shallower as they rise to the surface of the ground. The earth is thrown into the angles formed by the trench, and on this is placed two stout pieces of iron. In our field cremation work, where we have had several fires going at a time, two pieces of ordinary railroad rail 3 feet long, were used, and these prevented the body falling into the trench. The use of the trench is to provide the needful draught. Bodies can be burned whole, but it takes more fuel, and occupies about 12 hours. The quickest method is to eviscerate and remove the limbs; a layer of stout wood is now made as a base, and on this is placed the trunk, followed by more wood with the viscera on top. The pile is lighted with straw, and the wood if damp may require assistance with paraffin. The animal is readily consumed in 5 or 6 hours. The ashes may from time to time be raked out of the trench to keep the air passage clear. The blood shed by opening the body may easily be scraped up with the earth and thrown into the fire. It is only in cases of anthrax that any serious objection can be offered to evisceration before cremation, but with care no harm need arise. We have burned over 100 anthrax bodies by the above method. The greatest care was, of course, taken to collect everything that was shed on the ground and throw it on the fire; further, the hot ashes were subsequently scattered all over the place where the body had been opened."

There are lands known to the writer where it is simply courting disaster to place susceptible stock. The spores of the long buried keep coming up, and one tenant after another has such "bad luck," as it is called, that it is perfectly useless farming it for stock. There is no law, however to prevent a landlord letting, or new tenants taking, land which can never be remunera-

tive, and, as "hope springs eternal in the human breast," there are always persons to be found who will take such infected farms, although warned beforehand. Pastures of this kind should be broken up and put to any purpose rather than grazing.

On the Continent of Europe, where anthrax was formerly prevalent, a great diminution has been brought about by protective inoculation with a serum prepared by Pasteur's methods, but in Britain the number of animals affected was seldom greater than the number which either fail to be immunized by the serum or die from misadventure in employing it. It was not therefore found advisable to adopt it in this country, but improved methods of protective inoculation have greatly reduced the losses from anthrax on the Continent where it was formerly prevalent, and have been adopted with success in this country in districts known to be dangerous. Safer immunizing materials, capable of being employed by others than veterinary surgeons' are now on the market, and this applies more particularly to that half-sister of anthrax known as quarter-ill or black leg, which see.

AZOTURIA HÆMO-GLOBINURIA.

There is no popular name for this malady, and it is often mistaken by horsemen for a fractured limb or paralysis, so sudden is its attack. Errors of diet and management are accountable for it. It follows on too much stall feeding and want of exercise. After a spell of rest, particularly when due to frost, a horse comes out of the stable gay enough in behaviour and going at a fair pace, when suddenly, as if he had trodden on a nail or overshot a joint, the animal falls dead lame behind. The muscles of the quarter are in a violent spasm, and as soon as urine is passed it is found to be very dark in colour and containing much solid matter. Some form of exertion seems necessary to develop the injurious substance which has accumulated in the blood, as it does not occur in the stable, or until the animal has gone some little distance. The animal breaks out into profuse perspiration, wears an expression of agony, and in some instances will bite himself about the breast. In the worst cases, death follows in a few hours, the horse meanwhile being unable to rise. He is self-poisoned in some way as yet unexplained. In less violent attacks it may be possible to get the patient to the nearest stable, or convey him home in a float. He should have a bold dose of aloes (*see* Physic) as soon as possible, as the action of the drug will affect his blood long before its aperient effects are observable. This is one of the diseases in which blood letting is indicated, and three or four quarts should be taken from the jugular vein (*see* Bleeding) and the animal encouraged to dilute his blood with as much water as he can be persuaded to take. The urine, if not passed voluntarily, should be drawn off with the catheter. The loins should be poulticed, and, if a liniment of any kind is used, it should contain neither ammonia, cantharides, nor turpentine. Besides many deaths, there are frequent bad recoveries, in which the use of the affected limb is never properly restored. This trouble was of much rarer occurrence when the custom of giving a full dose of physic twice a year was common among horse owners. The most successful modern remedy, in addition to the treatment above advised, is to give one-dram doses of oxalic acid every hour for 8 or 9 hours dissolved in 5 ounces of water.

BRAXY IN SHEEP. LOUPING-ILL.

A number of diseases belonging to the same group have been called by this name. Occurring at the autumnal period chiefly, and characterised by so short an illness as often to escape observation, shepherds have noted distinguishing features, and speak of red braxy, white braxy, and water braxy.

Professors Hamilton and McCall have thrown much light on the subject, and regard these as separate and distinct diseased conditions. Braxy is now known to be due to a specific bacillus, the braxy bacillus. It occurs chiefly on the west coast of Scotland, the north of England, and west of Ireland, and in the months of November, December, January, and February, being rare at other periods. The subjects of it are generally under one year old and nearly always die, but Professor McCall says that "as the result of experimental research it appears probable that nearly all the young stock on an infected farm not showing marked symptoms of the disease have, during the months preceding its appearance in the virulent form, passed through a mild attack, and thus acquired a natural immunity." The death-rate is from 10 to 40 per cent. among hoggs, and this proportion is increased if young sheep from an uninfected district are introduced in the autumn. Two-year-olds rarely get it, and three-year-olds are believed to be exempt altogether. The mucous surfaces of the fourth stomach and of the intestine are the natural habitat of the braxy bacilli, and they are found in enormous numbers. The symptoms observed are a short and quick step, restlessness, lying down and rising again suddenly; separation from the flock, an increasing stupor and reluctance to get up as time advances; then death. In cases lasting a few hours the breathing is laboured, the head lowered, the belly blown out, and the temperature runs up to 105° to 108° Fahr.

Putrefaction follows quickly after death, and not, as Principal McCall points out, as the result of the ordinary putrefactive organisms, but from the work of the braxy bacillus. The first three stomachs are filled with ingesta, and the fourth is empty save for dirty brown fluid, which the microscope proves to be teeming with the specific bacilli.

Treatment is practically useless, no success attending any method adopted. Preventive measures have long been taken, but are attended with considerable expense. Sending the young sheep away during the danger period and homing them again when the season is comparatively safe, has been for long practised with a large measure of success. It is hoped that this costly expedient will no longer be necessary when a satisfactory culture of the bacillus can be given by way of the mouth and without professional assistance and hypodermic injection. Professor Hamilton has proved that at certain seasons of the year the blood serum of sheep favours the rapid development of the braxy bacillus, and that at other periods the organism not merely fails to grow, but actually dies, and his plan of imparting resistance or immunity is to introduce into the system the products of the resistant period, so that a mild and practically imperceptible attack will give immunity against the deadly variety. This, briefly, is the principle, and experiments upon some thousands have already given satisfactory results. The culture of braxy bacillus is given during the month of August. "This," says Professor McCall, "is found to be free from danger, and is so effectual that any mortality is hardly worth considering." Subsequent experience has proved very disappointing.

CATTLE PLAGUE, RINDERPEST.

The worst of all infectious cattle diseases, and known chiefly by the above terms, is chronic or always present in the steppes of Russia and parts of China, and from time to time breaks out in a westward direction, visiting all the countries of Europe, including the British Islands. Its last notable achievement has been the reduction of live-stock in South Africa by some 50 per cent. In the home of the plague it is not so virulent, and many animals survive and become immune, while their progeny take it in milder form, but when some

infected animal or hide carries the plague into countries that have long been free, the effects are disastrous in the extreme.

It is not necessary in a work of this sort to describe it with minuteness, as the first duty of a good citizen is to call in professional aid, and give notice to the police. No treatment is permitted, and in the very and, let us hope, increasingly rare occasions when the plague visits us, it cannot be expected that the stock-breeder should be able to diagnose the malady himself. The veterinary surgeon is required by law to give notice.

Fever, as usually shown by cattle, is the first symptom; dullness, rapid loss of strength (in cows, sudden decrease of milk), constipation, staring coat, shivering. The membranes are at first pink and then purple, and the vulva of cows shows the change perhaps quicker than other membranes. A variety of nervous symptoms may supervene, such as twitchings, delirium, and the suggestion of paralysis in refusal to get up. After a while diarrhœa sets in and is most offensive in odour, and containing lymph, matter, and blood-stains. With the aggravation of these symptoms the animal wastes and dies.

DISTEMPER.

In old books on farriery the word distemper is used to mean many different diseases, and in old English it has often referred to some epidemic among men. Now it is narrowed down to diseases affecting dogs, cats, and ferrets, and some other animals with which we are not here concerned.

Distemper in Dogs.—This is an infectious disease commonly contracted in puppyhood from the third to the sixth month. It may affect animals younger or older, but during the change of the principal teeth is when it most often shows itself. It is possible for a dog to have it twice, or for an old dog to contract it. The germ or germs of distemper have been the subject of many experiments, and cultures of more than one micro-organism have been credited with being the essential factor in the conveyance of the disease from one dog to another. At the time of writing this, there are rival vaccines on the market for immunizing puppies, and conflicting evidence published from equally competent authorities. It is in this direction, however, that dog lovers must look for relief from the grievous losses which have always been incurred among dogs, so long as history telleth.

Cats.—Since the breeding and showing of fancy cats assumed large proportions, a similar disease among cats has made itself severely felt. No doubt it existed, but in a mild form, when the "common or garden" cat alone adorned our firesides. When, however, the fancier steps in, no matter whether it be into the hen roost or the cattery, the kennel or the byre, constitution and stamina soon give way to special points or features, which the imagination of the fancier deems desirable and breeds up to.

Ferrets.—The distemper of ferrets is usually very fatal, and owing to the insanitary conditions in which these creatures are usually kept, they offer but a feeble resistance when attacked.

Distemper usually takes one of three principal forms, but these may be merged in one unfortunate animal, or succeed one another. The commonest is that affecting the breathing organs, and commences with dullness and loss of appetite as well as spirits, quickly followed by what looks like an ordinary cold; watery eyes and nose, and inability to bear a full light. The discharge increases in volume and density, and a peculiarly disagreeable odour is given off. In a favourable case these symptoms gradually subside, and restoration to health is only a matter of time.

In other cases the foregoing symptoms are daily aggravated and a low (*croupous*) form of pneumonia follows, with great prostration. The animal may die during this stage or break out into sores containing pus, breaking

away and desquamating. This eruption would seem in some to give relief to the animal by eliminating the distemper poison or its products; anyhow, it is often noticed that from this time the patient gets better.

Another form of distemper is characterised by diarrhœa, running on to dysentery, exhaustion, and death, or abating in severity and followed by gradual recovery.

A third form is that affecting the nervous system and shown in nervous tremors rapidly going on to palsy (*chorea*). If the disease makes rapid progress, the nerves governing the heart and lungs fail, and the animal dies from paralysis of the vital organs. What more frequently happens is a long illness and incomplete recovery; the patient ever after having "the jumps," chorea, or St. Vitus' dance, as it is variously called.

Treatment.—Given sufficient time, every vaunted remedy hitherto has failed, whether old-fashioned drugs or new immunising and curative sera. That one which at present holds the field is an American preparation, and some of the leading canine surgeons in this country have informed the author that their success with it has been quite marvellous. They also endorse the recommendations as to diet and management.

General Directions for Moore's Toxin.—To cure Distemper.—The treatment of an animal ill with distemper varies according to the stage of the disease during which treatment is begun. There are some procedures which should be adopted in all cases. First of all, administer hypodermically the entire contents of one vial of Moore's Toxin under the loose skin of the back. Always inject the entire contents of the vial at one time, no matter what age or weight of dog you treat. Next, whether the case be found in the early stage or during the period when diarrhœa is present, administer a laxative such as Epsom salts. Make no exception to this rule. It is important.

Give no solid food for some time. If the dog is able to take it, give milk and egg. Avoid broths until the dog is well on the road to recovery. Do not be afraid of a light diet. Give water if the animal wants it. Give no meat whatever, raw or cooked. A meat diet tends to produce chorea.

Do not allow your dog to exercise much, even though he (as the majority of dogs do, when taken in the early stage) show every indication of friskiness and good health during the entire run of the disease. Remember that six weeks is a short run for distemper, and that your dog must be considered sick, even after the injection of our Toxin has removed every visible sign of disease. Follow these directions strictly.

During distemper there are various foci of pus in different localities in the body. Wherever these may be found they should be emptied of pus. The glands of the neck frequently enlarge and then become soft, showing the presence of free pus; they should, at this stage, be incised. The chain of lymphatics encircling the rectum is frequently the seat of abscesses. These should be broken. In this site it can easily be done with the finger. The emptying of these abscesses, while not absolutely essential to the dog's recovery, should be resorted to as a routine measure on the general surgical principle of removing pus wherever it is found.

During the dog's illness, especially the early part, keep him warm and free from draughts. Guard against pneumonia. It is always wise to blanket the dog, to guard against changes of temperature.

Adhere strictly to these directions. Keep always in mind these points: Give the whole dose of Toxin at once; follow immediately with laxative; adhere strictly to a light diet; look for rectal abscess; keep the dog warm, dry, and out of draughts.

Moore's Toxin has no effect upon anything but distemper. It does not cure pneumonia, worms, or other ailments. Don't expect it to.

Peri-Rectal Abscess.—In a large number of cases—in fact, nearly every one—of distemper, rectal abscesses will be found. To those who do not clearly understand the best method of handling them, we make the following suggestions :

Take the dog carefully between the knees and bend the tail sharply upwards. This will cause the rectum to project. With the thumb and finger press firmly upon the projection, as if to extract the milk from a cow's teat. Use considerable force. If there is an abscess, this will break it and press out the pus. Be careful that the pus does not fly into the eyes. Repeat this operation every day so long as there is pus. You will find this is a material aid in effecting a cure.—Middle Mass. Chemical Co., Palmer, Mass., U.S.A.

Biologic products should be treated with exceeding care in regard to thermic conditions. Keep them cool and dry.

For Immunization.—The entire treatment for immunization consists of an injection of one vial of Toxin.

At any time during the continuance of distemper the dog or cat may develop ulcers on the front of the eyeball. A portion of the conjunctival membrane and the cornea beneath it dies and a ragged ulcer or gap is left. In some instances this enlarges, the anterior chamber is ruptured, and the aqueous humour escapes. The result is blindness for life. Despite our general helplessness in the presence of distemper and the serious nature of ulceration of the eye, we are able to do more for it than for any other of the complications or *sequelæ* of this dreadful disease. An antiseptic lotion (eusol) is advised, to clean away the matter frequently, but the ulcer itself should be touched up with a camel-hair pencil and a ten per cent. solution of protargol. This, in quite the majority of cases, will arrest the spread of the ulcer and bring back reparative power to the eye. Healing up is followed by a cloud of more or less density and spread over a considerable area, but the edges will presently assume a bluish hue and gradually vanish, until only a nebula or spot in the centre, which is really a scar, is left. Some very slight trace will almost invariably remain, but for all practical purposes the eye may, and generally will, completely recover, if the attendant is not too much afraid of the remedy. Other forms of eye trouble come as *sequelæ* of distemper, and their treatment does not differ from that recommended in diseases of the eye, to which the reader is referred.

What has been said with reference to distemper in dogs applies equally to cats, with the exception of chorea or the nervous form, to which they are not so subject, although not wholly exempt.

Ferrets may be treated in the same way, but special attention should be given in the removal to new quarters and cleaning and disinfecting of hutches (*see* Disinfection). Tradition says that a new-born kitten is a specific for distemper in ferrets.

FOOT AND MOUTH DISEASE, MURRAIN.

(Aphthæ epizooticæ.)

This disease does not seem to have been known in England until the nineteenth century, but serious outbreaks in France and Germany were described in the middle of the eighteenth. Solipeds—horses, mules, asses—do not seem to be susceptible to it, but cattle, sheep, swine, dogs, and human beings may be infected, either by its fixed contagion or volatile essence. By the latter it is carried on the clothing of individuals from one place to another. No doubt the police inspector and the veterinary surgeon contributed largely to the dissemination of the disease in the first great outbreak, before it was known to be communicable save by direct contact between sick and other animals. A micrococcus is said to be present in the pure vesicles, and has

by culture reproduced the disease. As the knowledge is not of any present value, we pass on to consider the

Symptoms.—With only slight feverish symptoms, more likely than not to escape observation, the stage of vesication is reached in which the affected animal is discovered slavering or dribbling at the mouth. He may or may not be lame at the same time. In the first outbreak the two conditions so generally accompanied one another as to have given the name of "foot and mouth disease." Examination of the mouth shows little eminences, becoming vesicles or bladders, later on to break and leave an ulcer or ragged sore. The gums, tongue, and any part of the membrane of the mouth may show them, but their favourite situation is the pad of the upper jaw. Examination of the lame foot shows a similar condition on the coronet and between the digits. When both foot and mouth are affected, there is no doubt as to the nature of the disease. This is all we require to know; the rest is done for us, whether we will or no. The police must be informed, and they will put the cumbrous machinery of the law to work.

Stringent regulations exist now in almost all countries, and England's example of "stamping out" has been recognised as the wisest policy, although entailing some amount of hardship on individuals.

GLANDERS AND FARCY, FASSY, FASS, ETC.

It is now definitely proved that glanders and farcy are due to the same specific bacillus, and it is incumbent upon the owner of an animal affected with either form to give notice to the police and have it destroyed.

The history of glanders is as old as the history of war in which cavalry have been employed. Its spread invariably follows the conclusion of peace: each combatant taking home the seeds of the malady and spreading it among horses employed for civil purposes. The British Army claimed to be free from glanders at the time of the declaration of war in 1914. The institution of an Army Veterinary Corps, since raised to the status of "Royal," has been abundantly justified by the almost complete control of glanders. Never were so many animals employed before or such a measure of success attained. The whole cost of the R.A.V.C. was saved many times over by the prevention of glanders alone.

With our present knowledge of the disease it is easy to see how the bringing together of large numbers of horses is hardly possible without the introduction of some few cases of latent glanders into an atmosphere and under conditions favourable to its development.

Horses, mules, asses, lions, tigers, dogs, goats, and guinea pigs are receptive to glanders, but cattle and pigs have proved resistant. The death of stablemen from glanders is, alas! a well-registered fact.

Infection may take place through the atmosphere, the inspiration of the bacillus, or, as more commonly happens, through the medium of the food when a horse feeds out of a manger lately occupied by another which has soiled it, or the forage remaining with the discharge from his nostrils. This is most noticeable in bale stables, where one animal can blow over the food of the next. The blood of a glandered horse, introduced into a sound one, produces the disease very rapidly. The nasal discharge may produce farcy in another horse, and the matter from a farcy ulcer may produce glanders. The distinction between glanders and farcy is in the external signs, not in the cause or nature of the malady. Bad air, hard work, short commons, and exposure to sudden and violent changes of climate are only developers, not actual causes. Hence we find it break out on board ship, though the consignment had all been carefully examined and certified as free from all outward signs of the disease. Some latent case has come on board, and the foul

atmosphere between decks has favoured its development. The gentleman's horse that has not thriven well and has been sold as no longer stylish enough, falls into the hands of a poor man, and the hardships develop the disease, which was all the while latent, if not suspected. Influenza and bad colds are followed by glanders, but the seed—the bacillus—must have been there before, or sought and found a suitable site for multiplication during the illness.

It was at one time thought that excessive doses of aloes caused glanders. Such is not the case, but a large dose is a capital test in a doubtful subject, bringing it out in unmistakable fashion. Whatever differences of opinion exist among scientists, they are all agreed that there is no such thing as a new creation, whether in those forms of life which produce disease in animals or in any other. All life, it is agreed, springs from previous life. It is to be regretted that another disease, wholly different from glanders and farcy, has long gone by the name of farcy or " water farcy," as this adds to the confusion of the horse owner who does not need to slaughter a horse suffering from the latter, and we would impress upon readers the importance of an expert opinion where any doubt exists (*see* Water Farcy or Weed or Lymphangitis).

The vitality of glanders poison (of the bacilli) is a matter of the utmost importance, as suffering or forbidding us to again use buildings in which the infection has been discovered. Mr. Hunting, who was our best authority on the subject, said in this connection : " It is quite certain that glanders poison exposed to the air and kept moist very soon decomposes and becomes harmless. When dried it retains its vitality much longer. Successful inoculations have been made with the poison kept dry six weeks, but this seems about as long as it can be kept when exposed to the air, even under favourable conditions." Experiments outside the body show that the bacillus grows best at about the temperature of the living horse ; much higher or lower its growth is arrested.

Symptoms.—These are easily recognised in a fully developed and acute case, but there is a chronic and slow form of the disease which may become acute under certain conditions, such as fever, exhaustion from labour, excessive doses of aloes, etc. Loss of health, poor appetite, staring coat, languor—these are common to many diseases and frequently accompany this ; such signs are not diagnostic, although they may rouse our suspicions in a stable where other cases have occurred. Where a stud is in charge of a veterinary surgeon he will separate these suspects, and, if they regain a normal temperature, take the opportunity of applying the mallein test, which is very much more reliable for glanders than is tuberculin for tuberculosis. If the animal has latent glanders a characteristic swelling takes place at the seat of puncture by the hypodermic syringe : the temperature of the animal is raised, and perhaps other symptoms follow. Only an experienced and qualified man should be allowed to apply this test, and only such an one will be able to appreciate the developments and decide the case. Against latent glanders in a horse about to be purchased, no one, be he vet. or farmer, can secure himself by any powers of observation or previous experience. He may get an undertaking or warranty from the vendor, but that is another matter, and one the seller may think twice about giving. Swelling of the glands under the jaw may precede a discharge from one or both nostrils. Swellings here may also accompany influenza and bad colds, and the formation of an abscess between the jaws is the special symptom of strangles. How then are we to distinguish ? The glandular enlargements of glanders are at the sides of the jaw, and, save in very acute cases, they are slow of development, and rarely attain any great size. In strangles they come in the middle of the space, and as a rule a single swelling, not always so, but they are invariably tender, while the opposite is the rule with glanders. We shall not be guided alone by these glandular enlargements ; we shall watch the nasal discharge and the mem-

branes inside. In the initial stage both will be red, but in glanders there will presently appear dull grey spots, a little above the level of the surrounding membrane. They vary in size from that of a pea to a penny piece, soon breaking away and leaving an irregular ulcer with a clearly defined margin. They show very little disposition to heal at this stage, nor do they enlarge : they multiply at other places. There is nothing characteristic in the discharge ; it has a disposition to dry round the nostril and is sticky, but this is not a diagnostic symptom. The ulcer is the thing to rely on, especially in conjunction with other symptoms. High up the nasal passages ulcers may form, and from them a discharge collect and be ejected in occasional spurts. To such an extent is the membrane thickened and the passage occluded that suffocation threatens. Acute cases such as these run their course in a few days, and the animal sinks and dies of exhaustion. If he survives this acute attack, the symptoms abate, the discharge diminishes, the glands decrease in size, the ulcers heal up, leaving a white scar or cicatricial tissue which an expert identifies as due to a previous attack. These are the animals which spread glanders about the country. To all outward appearance, and to any but the experienced veterinarian, the subject may be sound ; but his lungs are the seat of the disease, and his breath conveys the poison which other horses, stabled with him, are liable to inhale and so become infected. When such a horse gets a cold, influenza, or is shipped abroad, the conditions favourable to the bacilli are found, and no longer latent, it breaks out in virulent form.

Farcy.—When the skin and tissues immediately underneath is the seat of the glanders poison ; when small hard swellings, known as farcy " buds " or " buttons," make their appearance, the disease is recognised as farcy, but it cannot be too earnestly insisted upon that a horse with farcy is a glandered horse. These buds come upon the inside of a hind leg as frequently, perhaps, as anywhere ; but the face, neck, and sides are often included. Connected with the buds are corded swellings, following the lines of the neighbouring lymphatic vessels, which are inflamed. These buds soften and burst after a while. It is in the cases which only show a swollen hind limb and ere the buds and inflamed cords appear, that a so-called " water farcy " leg and real farcy may be confused, but a very few days will determine. If the aloetic purge is given it will bring out a real case of farcy, but in the so-called water farcy it will have a curative effect. The appearance of farcy buds may precede the symptoms described as belonging to glanders, or the nasal discharge, ulcers, and enlarged submaxillary glands may have all been in evidence before farcy makes its presence known. Farcy, in a word, is glanders as seen in the skin.

In the old coaching days many glandered teams were kept at work, and the " farriers " of those days acquired much knowledge of how to " knock it back." Some of this knowledge remains with the worst class of dealers, and is made use of to " plant a wrong 'un " on the unwary. The law requires the destruction of glandered animals, and any suggestions in the way of treatment, whether for glanders or farcy, in this work, would be altogether immoral and outside its scope. The reader is again referred to so-called water farcy below.

LYMPHANGITIS.

(*See* Big Leg and Elephantiasis, page 12.)

Water farcy, Big leg, Monday-morning-leg, Weed, Shake, Shot-of-grease, &c. By these and some other names is the sudden and painful swelling of a limb recognised in horses, when due to inflamed lymphatic vessels.

Symptoms.—A shivering fit or attack of rigors precedes the pain and lameness of the limb, but is often not noticed as it occurs during the night, and the first symptom observable is the inability of the horse to move across the stall when first attended to in the morning. The most common subjects of it are draught horses which are well fed and regularly worked, until a holiday or some interval occurs, when waste of tissue is not equal to the absorption of rich food. It may and does happen to the ill-fed and poor; as gout is no stranger in the workman's home; but lymphangitis will be most seen in the stable where beans are not spared, and gout where good living is the rule. A hind leg is the most frequently affected; sometimes forsaking one limb for another. Front legs are not immune. The pain experienced is so great as to make the patient "blow," and leads to mistakes in diagnosis.

FIG. 1. LYMPHANGITIS.

the trouble being assigned to the lungs. More or less constipation is present, high-coloured urine, hard, strong pulse, and the usual signs of pain in the animal's expression. The affected limb is held up, or resting only on the toe, and very painful to the touch. The swelling is sharply defined in most cases, appearing often as though a string had been tightly tied in an oblique direction over the limb. With such symptoms there is no excuse for mistaking the acute disease for farcy, but after repeated attacks, when the limb is permanently enlarged, but cool, some experience is needed (*see* Farcy at page 10).

Treatment.—No time should be lost in administering a bold dose of aloes in the form of ball (*see* Physic). Warm fomentations with an ounce of

laudanum and an ounce of sugar of lead to each gallon of water will be helpful, and in the intervals the skin should be dressed with olive oil, or glycerine one part, water seven parts; or one ounce of liquor plumbi fort and seven ounces of linseed oil, these agents making soft the skin and facilitating the swelling, which gives relief to pain. Alcoholic stimulants to counteract the extreme depression are not to be recommended, if we make exception to spirit of nitre, which may be given in doses of one or two ounces; this acts on the skin and kidneys, but any larger quantity of spirit will precipitate and coagulate lymph in the affected limb. The chief thing in treatment is to get a satisfactory action upon the bowels, after which the inflamation subsides, and the fluids in the limb are absorbed. The latter may be helped by what are known as diuretic remedies, which see. The question of exercise naturally comes up, and upon this there is difference of opinion, so good an authority as Professor Williams stating that "exercise certainly dissipates the swelling at the time; but after the patient has stood for a few hours the swelling returns, and it is no less curious than true that each fresh exudation tends more and more to become organised."

The best of all preventives is sulphate of magnesia (Epsom salts), and a dose of two to five ounces added to the common diuretic of nitre, one ounce, and sulphur, two ounces, in a bran mash once a week will stave off an attack indefinitely in most horses.

BIG LEG, ELEPHANTIASIS.

Elephantiasis is the result of repeated attacks of the disease last described, which see, pages 10 and 11. Upon recovery from a "Monday-morning-leg," the patient should be gently exercised, then put to work, and given a diuretic dose once or twice a week for a time. The writer thinks that heavy horses which have once been attacked should certainly have one, if not two diuretic doses in bran mashes each week, and, if possible, each summer a short run at grass. There is no treatment likely to reduce a chronic big leg, and we have seen many made worse by ignorant interference and the application of blisters.

INFLUENZA, PINK EYE.

A severe cold is often spoken of as influenza, but what we wish to describe here is another and altogether distinct malady affecting the equine species, and due to a bacterium which has been cultivated and proved to induce the specific disease when horses, mice, rabbits, and pigeons are inoculated with it. It is concisely described by Finlay Dunn as a "contagious febrile epizootic of horses, affects primarily the respiratory tract, but also involves the nerve centres, circulatory system, digestive mucous membrane, eyes, and subcutaneous structures. Communicable chiefly directly, but also indirectly; producible by inoculation of exudate; occurs in ass and mule; is not transferable to or from man."

The disease takes many forms and produces a variety of symptoms, involving widely different structures. Almost every visitation of the plague brings variety. At one time the respiratory organs are the chief seat of trouble, at another the circulatory, and, again, the nervous or the digestive, with all sorts of complications. In America the first serious invasion was associated with so much febrile disturbance and injection of the conjunctival membranes, that it soon acquired the name of "pink eye."

Symptoms.—Since there are so many types of influenza the symptoms necessarily vary, but with all there is a preliminary depression of spirits, a dulness of no common order. A condition which may be considered as one of shock: the vital powers receiving a severe shock, before any definite form of the malady declares itself. To describe the symptoms of the pulmonary and other forms would be to traverse the ground again, in which

we have considered the diseases of the chest, of the digestive system, and of the nervous, besides what has been written of rheumatism; and for treatment the reader is referred to those maladies.

Treatment of influenza consists chiefly in counteracting the shock first sustained. In good nursing and hygiene (*see* Care of Sick Animals) combating the various symptoms, as they arise, with suitable remedies. The affected animal should be immediately removed to a loose box if stabled with others, and precautions taken against infection. The person looking after the patient should have nothing to do with other horses, and if no separate building is available, a sheet saturated with disinfectant should be suspended between the sick and other animals. The temperature of the invalid chamber should be kept at 60° to 65° Fahr. Clothing, which should include a hood and bandages for the legs, is advised, and tempting foods (*see* Invalid Foods).

For medicine, alcoholic stimulants have gained most favour, especially in the early stages. Two or three ounces of mature whisky in half a pint of water every four hours, and a drachm of quinine twice a day, have been found to sustain the patient devoid of appetite, and the addition of a drachm of extract of gentian mixed with the spirit, is the most likely drug to restore the desire to eat. The swelled eyelids may be disregarded, for they protect the eye from light it would be unable to bear, and the membranes easily regain their normal condition when the constitutional symptoms abate (*see also* Congestion of the Lungs, Rheumatism, Paralysis and Swelled Legs and Sheath). Second only in importance to early recognition of the disease and prompt attention, is the need of caution in letting the patient go to work again. Many fatal relapses are the result of impatience, and a horse which has suffered from influenza should keep holiday until he begins to be playful, or "fresh" as it is called. The work should be moderate only, and the feeding generous.

PURPURA HÆMORRHAGICA, BIG HEAD.

This disorder of the blood is seldom met with in any animal but the horse, and is characterised by fever and circumscribed swellings of the skin, and blood stains or extravasations on the mucous membranes. The cause is not very well understood, but is probably the introduction into the system of some ferment which causes decomposition of the red blood corpuscles, and in this respect it resembles red water in cattle. The subject of purpura is found with more or less swelling, frequently about the face and muzzle, giving the animal a most remarkable appearance, as of a hippopotamus, or the limbs may be chiefly involved. The membrane lining the nostrils will be found to have dark red spots upon it of variable size which may be compared to bloodshot eyes; not engorgement of small vessels, but ruptures such as are familiar under the foregoing term in human eyes; and more or less brick-coloured discharge. In extreme cases the broken up blood oozes through the skin, and a white handkerchief passed over the swellings will show stains. Extravasations of like nature are found in the lungs and other organs of dead subjects. It is commonly spoken of as a disease of dark town stables where ventilation is bad, but I have seen it in forests and in all sorts of situations. It may attack an apparently healthy horse, but more often follows on some debilitating disease, as influenza. Difficulty of breathing is a pronounced symptom in many cases, and that not so much from internal trouble or high temperature as from pressure of the swellings upon the respiratory tract.

Treatment.—Although many horses die from purpura, it may be considered on the whole as offering fair prospects of success, by hygienic and medical

treatment. The sufferer should be placed in a light airy box; with sunshine if possible; certainly with abundance of fresh air, and a clean dry floor above suspicion as to drainage. Unless the weather is hot, the patient should be well-clothed, and nutritious food given in tempting forms (*see* Sick Foods); oatmeal gruel, milk, eggs, and alcoholic stimulants are particularly recommended. Half-ounce doses of chlorate of potash in half pints of water twice daily for two days, then half the quantity, has been found good treatment. Turpentine and tincture of perchloride of iron is believed to arrest decomposition, and hold together the blood corpuscles, as well as carry off much effete material by way of the kidneys. As much as one ounce of the tincture of iron and two ounces of turpentine twice daily has been given with safety, but lesser quantities at shorter intervals are better. The most modern treatment is by iodine. One ounce to one and a half ounces of the following mixture is injected into the trachea twice daily (*see* Husk, Intratracheal Injections, etc.): one part of iodine crystals, six parts of iodide of potassium, and one hundred parts of water; or balls containing fifteen grains of iodine three times daily.

Local swellings are eased by bathing with warm vinegar and water (equal parts), and, where the skin seems specially tight and painful, an abundant dressing of olive oil, to which one part in fifty of carbolic acid has been added. Where suffocation threatens, tracheotomy should be performed. If no veterinary surgeon is available, the owner may make a three-inch incision down the windpipe, choosing the middle portion of the tube where there is least muscular covering, pass a curved needle through the cartilage, to secure it from falling into the windpipe, when he cuts out a circle from half an inch to three quarters in diameter. The prompt performance of this operation in cases of purpura, of laryngitis, and of strangles, when suffocation threatens, has saved many lives, and we have known many a bold farmer who would undertake greater risks. Pending the arrival of a vet. the skin may be stitched back in order to keep the opening clear. It is a rough expedient, but better than losing a valuable animal (*see also* Strangles and Laryngitis).

QUARTER-ILL, BLACK LEG, BLOOD STRUCK, POOK, SYMPTOMATIC ANTHRAX.

This malady much resembles anthrax, but is not caused by the same bacillus: it has one of its own. It more often affects hind-limbs than front ones, and from this circumstance has derived one of its many appellations, but an animal may be struck anywhere, head, neck, fore-limb (high or low), loin, stifle, or hock. Many of the cases I have seen have not been marked on the outside of the victim, but post-mortem examination has shown the characteristic lesions in one or more organs. Cattle and sheep, goats and rabbits are easily inoculated, but horses, asses, and white rats show only a local swelling at the point of puncture; the black rat, the pig, the dog, and bipeds are immune. The bacterium is supposed to enter the body by means of abrasions upon the legs or feet, and the most frequent subjects are calves between five and twenty months, but one sees it sometimes in both younger and older animals.

Symptoms.—The struck animal is found away from its fellows—the most sociable being compelled by instinct to separate itself from the herd. It is lame, or else apparently paralysed, rooted to the spot, and afraid to lie down, generally retaining a standing position until it falls and dies. There is a depressed appearance about the face and head, ears drooping and head lowered, and general loss of sensibility as of one under the influence of some powerful narcotic. The most diagnostic symptom of any is the crackling of

the skin, when the hand is passed over the region affected. A rapid decomposition of the blood gives rise to gases which accumulate under the skin, and this it is which causes the peculiar sound.

Treatment.—Curative measures are practically useless, but there are cases on record where animals have recovered when the swelling has been slashed open and a hot iron or melted tar or other active disinfectant applied quickly. The bacterium being one of the class which cannot thrive in the open air, it is possible that in some rare cases it has been extinguished by such exposure before the whole animal has been invaded.

Prevention is best attempted by keeping young stock out of affected pastures. Inoculation with a special vaccine has been practised with much success, and is increasingly employed.

Since the earlier editions of this book were published, much progress has been made in the production of immunizing sera, and more than one reliable firm supply preparation cords which any intelligent person can use according to the simple directions which accompany the prophylactic materials.

The old custom of setoning the dewlap has gone out of favour (*see* Setons, Setoning, and Rowels).

Dead subjects should be burned in their skins or deeply buried in quicklime (*see* remarks on Disposal of Anthrax Carcases, which apply here also).

Disinfection of premises should be practised where infected subjects have been kept (*see* Disinfectants).

MADNESS IN DOGS, RABIES, HYDROPHOBIA.

It should be clearly understood that rabies never arises from any other cause than the bite of another animal already rabid, or the intentional inoculation with rabific matter. Dogs do not "go mad" on account of hot weather, or cold, or as the result of starvation or ill-treatment. Rabies is a specific disease, which can only be caused by rabies; it can no more be bred by circumstances than grapes can be grown of thistles or figs of thorns. Hydrophobia is the disease which human beings suffer from when inoculated by the bite of a rabid animal. All days are "dog days" to dogs, and the position of the dog star has no influence whatever on rabies.

A person or animal bitten by a dog, not already suffering from rabies, cannot thereafter contract the disease, as the result of future madness in the animal which inflicted the bite. It is truly absurd to have to make such a statement, but it is necessary, as there are still people who cause others the most acute mental anguish by propagating the story that a bitten person is liable to suffer from hydrophobia, *if the dog subsequently goes mad.* The remedy offered by these foolish people is as unreasonable as their fears, namely, the immediate destruction of the offending animal. A moment's reflection should suffice to make them keep the dog alive at all costs, in order to prove that it doesn't afterwards go mad, and that the bitten individual remains safe. Another popular fallacy needing correction is the statement that mad dogs dread the sight and sound of water. On the contrary, they are only too anxious to drink, and when unable, from causes presently to be explained, will plunge the muzzle under water repeatedly, in vain efforts to quench thirst.

The importance of the foregoing statements is urged as my excuse for departing from all precedents, and describing what rabies is not, instead of following the usual rules of describing what it is.

Rabies is one of the specific diseases due to a poison which is conveyed by inoculation or direct introduction into the system. Its period of incubation is uncertain. In dogs, from three to six weeks may be taken as the

average time, but some have developed it in a few days, and in authentic cases many months have elapsed before the malady has declared itself. All animals, including birds, are liable to rabies, and it is alike incurable in every species. Rabies was recognised in the fourth century B.C., and described by Aristotle. It is alluded to by Virgil, Horace, Ovid, and Plutarch. Nearly all the countries of the world have suffered from it, Australia being among the few exceptions. It was extirpated from the British Islands, but reintroduced during the Great War. When it is remembered that cats, foxes, and rodents have never been controlled by the muzzling order, it is almost too much to hope that no single animal is alive that can perpetuate it. When horses, cattle, sheep, or pigs suffer from rabies it is nearly always due to the bite of a rabid dog or fox, and the last-named animals have been revenged upon their pursuers by introducing rabies into valuable packs which have all had to be destroyed.

Symptoms.—These vary a good deal, and according to the species of animal affected. Dogs are the principal sufferers, and in them two chief forms of rabies are seen—the furious and the dumb. These are the divisions adopted by the greatest authorities, but from an experience of forty-five cases in one year, the writer would like to add that the half of them are neither furious nor dumb, but often retain their affection and gentleness until paralysis puts an end to them. The first signs are change of habit; the once cheerful dog seeks solitude, and retires under furniture, and gets away by himself, where he sits alone absorbed as it were upon some melancholy theme, until interrupted. If called by a friend, he comes forth with an effort to be agreeable, wags his tail and approaches with the usual kind intentions, but seems suddenly to remember a grief and slinks back again to a dark corner. Some dogs will be more demonstrative than usual as if craving sympathy for a trouble that ought to be obvious to anyone. This desire for help or pity is not peculiar to the most petted, but may be shown by an animal not previously of a demonstrative type. On the other hand, a fond creature may suddenly become morose and later on "furious," or disposed to attack other animals or human beings. After the first stage, in which, as we have said, the animal desires solitude, a restlessness sets in, and if at liberty the dog will roam in an aimless manner, but in a circle which brings him back at night to his home. A morbid appetite is among the early symptoms. The animal will eat wood and coal and other hard substances. During his wanderings he will snap at any other animal or at inanimate objects which happen to be in his path. He does not fight with other dogs, but snaps and goes his way. During this time he is consumed with a burning thirst which he endeavours to slake by plunging his mouth into any fluid he comes across, and will do this with urine, trying, if confined, to drink his own, but he cannot swallow, for the fauces and back of the mouth are so much under the influence of muscular spasm that deglutition is difficult, if not impossible. The eyes indicate a wandering mind, capable in most instances of being recalled to the present by a familiar voice, but relaxing into dreamland almost immediately, or seeing imaginary objects at which he is disposed to snap, as healthy dogs often snap at flies. Arrived at this period, he may at any time become furious, and destroy his kennel and any object within his reach. From the first his voice has changed, and he gives forth a hoarse peculiar sound which may be described as a compound of rage and despair. Death takes place usually between the fifth and eighth days, but nine and even ten days have elapsed between the first symptoms and the final collapse.

Dumb Rabies.—Much misconception exists concerning this condition. Owing to the swollen state of the tongue, the mouth cannot be shut, and ordinary sounds are not emitted; but the word "dumb" is a misnomer,

for dogs with this symptom of rabies will throw up their heads and give vent to the characteristic howl when left alone. I make this statement from actual personal knowledge, and not only of one or two, but of many cases under my own care and in my own hospital. There is one important difference, and that is the indisposition to bite in the so-called dumb form of rabies. The end is the same : death comes from paralysis.

Rabid horses become restless and exhibit signs of terror. They paw the ground, stamp, neigh as if calling to others unseen, but apprehended in some other way. Stable fittings are bitten and destroyed, and some horses both bite and kick persons or other animals, but they are not always aggressive. The seat of the bite which gave rise to rabies may become irritable, and the patient rubs, scratches, or bites if upon a limb. The muzzle or lower portion of a limb is the most frequent site as being accessible to a rabid dog. The appetite is at first ravenous and presently lost entirely. Some will eat their own dung and crush any hard substances, breaking their front teeth in so doing. The urino-genital organs are excited, urine passing frequently, and entire horses leap upon mares and involuntarily emit semen. The sexual appetite is excited in mares, and hysterical screams are given vent to. Convulsions and muscular spasms and symptoms resembling acute colic often precede the paralysis which puts an end to life.

Rabid cats display a disposition to leave their homes and a great desire both to bite and scratch. From their habit of climbing on the person they are the most dangerous of all rabid animals, inflicting bites upon the face. The usual fear of dogs is lost, and they will fiercely attack them. The voice is hoarse. Cats succumb within four days ; frequently on the second or third.

Rabid pigs show great excitement, digging up the ground and tossing their litter, squealing, and in the intervals of such paroxysms hiding themselves. They foam at the mouth and show a great inclination to bite. The dumb form has not been observed, and the pig's life seldom extends over the second day.

Sheep and goats show excitement, and gnaw the bitten part, pulling out the wool around it. Their usual timidity gives place to pugnacity, and some will bite at a stick when thrust at them. The voice is roughened, and they bleat or snort defiance when approached. Goats jump upon high places and assume a forbidding appearance. If one sheep in a flock is attacked there is always reason to fear that others will develop disease, for the dog that bit one will almost certainly have bitten a large number, if not interrupted.

RED WATER, BLACK WATER, MUIR-ILL, HÆMOGLOBINURIA.

The above names are given to a disease of cattle in which the most prominent symptom is the passing of urine stained red, purple, or so dark in colour as to appear black to the casual observer. Young stock in poor condition, and cows soon after calving, are the most frequent subjects, but cattle, and occasionally sheep, at any age may get it. It is to be distinguished from bloody urine or blood in the urine. There are no whole red blood corpuscles in the red water, but disintegrated blood. A toxin in the circulation causes the red corpuscles to break up, and this makes the discoloration in the urine (*see also* Black Quarter, Anthrax, Azoturia and Purpura, in all of which blood diseases there is a disposition to decomposition or disintegration of the corpuscles, due to some ferment or bacterium).

Investigations conducted in South Africa, in the Western States of America, and later in Ireland, have led to the identification of red water and Texas fever as being due to the bites of ticks. Sir Stewart Stockman, of the Veterinary Department of the Ministry of Agriculture, carried out the most

exhaustive experiments while serving the Cape Government so well, and he has warned us that we may get the more virulent form of red water imported, as English ticks are capable of conveying the African variety of the disease. There are two ticks in Britain, the Ixodes ricinus and Ixodes punctata, which act as purveyors of red water. The tick herself is infected by sucking the blood of an animal having the malady, and then infects whom she bites. It has been proved that the larvæ can inherit and pass on the disease. Whether any other means of infection exists is not known. Sir Stewart Stockman's experiments and conclusions were repeated and confirmed by the late Professor Mettam in Ireland, and there seems to be no reasonable doubt about it being a tick-borne disease: only an unsatisfied curiosity remains to ask how it is that one field produces it, and the next does not, and how a gate can sufficiently interpose. We have certainly known such sharp divisions between infective and non-infective areas, and the authorities above quoted have not been able to explain the circumstance. Very satisfactory proof has however been given as to the tick being the bearer, because lands vacated long enough for ticks to die out have ceased to infect stock when again put on it. In South Africa, the necessary interval is estimated at fifteen months. Ticks are very tenacious of life and resist summer heat and winter cold. I had some sent by an old pupil from Australia (in a pill box) which had been confined for months and were still apparently quite strong, although flat for want of food. To destroy them by any dressing upon the land is out of of the question. A dressing that will kill ticks is unsafe to their hosts, besides which, the parasites attach themselves under the arm-pits and thighs; a predilection which should favour the home farmer with cows under control. They should be hand picked daily. The late Professor Williams, when investigating this disease in the West Indies, recommended Indian game fowls as tick gatherers, on account of their long legs and extensive reach. In very badly affected areas it might be possible to make such a change in the management of the farm as to give fifteen months' complete holiday from grazing cattle, but something can be done to keep down ticks by daily picking over beasts that are at any part of the day confined.

Symptoms.—The affected animal usually gets away from his fellows, and wears an expression of dejection and listlessness. Breathing is quick and shallow, pulse small, irregular, and weak, while the heart is labouring under excitement, and sometimes to be heard at a distance of several feet. In milkers there is a greatly diminished secretion, and in some the milk is stained a pale brick colour. There is constipation at first, and diarrhœa later on. The patient keeps on the ground as much as possible, and when standing arches the back, at times as if to urinate, without doing so. The membranes of the vulva are dark and puckered looking. These symptoms may continue and increase until the wasting animal collapses and dies. Where recovery takes place, they gradually abate, and in some cases, treated early, would appear to be almost at once arrested.

Treatment.—Between the old and new school of practitioners there is great difference of opinion as to treatment of this malady—the old practitioners believing that their experience has shown more recoveries from the early administration of a drastic purge and diuretics, than results from the tonic and sustaining methods adopted by the new men, who would combat above all things the exhaustion which follows rapidly on decomposition of the life fluid which poisons instead of sustains the animal.

By the former a dose of as much as two and even three ounces of aloes would be given, together with two ounces of nitrate of potash, and an ounce of ginger and other cordials, and if this soon acted as an aperient (which it

didn't always do) the case was regarded as hopeful. Following on this, stimulants of alcohol, as brandy or port wine—preferably a bottle of old port twice a day—would be given, and, if any medicament, an ounce or two of turpentine in any bland fluid, as linseed tea, or gruel, or in milk.

Roots would be withheld, and the best of food and most tempting offered, and in some cases where inappetence was marked, drenching with oatmeal and flour gruel in warm ale or stout, at frequent intervals. The loins were also rubbed briskly with a liniment of ammonia, ox gall, and turpentine, or some favourite nostrum of the white oils type.

As an example of the new plan of treatment, we may quote from Mr. Thompson's lectures, which say: "The poor brute's condition becomes much more aggravated by the owner pouring into it large doses of relaxing purgatives [one might suppose all purgatives were relaxing] which only hurry it on to dissolution. The treatment I [author—Prof. Thompson] recommend, as soon as the animal is observed to be affected, is to give it from fourteen to twenty ounces of common salt in two quarts of gruel, and then to place in front of the patient a large pail of hay tea or bran tea, or cold water and milk, in which from two to three ounces of hyposulphite or bicarbonate of soda are dissolved. This must be renewed as soon as the patient drinks it. It should be followed by ten ounce doses of linseed oil, to which are added one ounce of sweet spirit of nitre and one ounce of balsam copaiba, and this should be repeated every twelve hours, if necessary. Should the bowels not respond, small doses of salts—from three to five ounces—may be given, along with warm cordials, such as one ounce each of ginger, gentian, sweet pepper, and mustard in a quart of warmed ale, or in gruel containing half a pint of whisky, every six or eight hours."

Prevention may be attempted by draining the land and by heavy dressings of salt, as much as ten cwt. to the acre being recommended every fourth or fifth year. Districts formerly much affected have ceased to show cases of red water where this practice has been carried out over a number of years.

The most successful of all means of prevention is that of a series of dips in an arsenical solution. Baths or "dips," as they are commonly called, have for some years been used in South Africa in combating red water and East Coast fever and other tick-borne diseases. At the remount depots during the late European War similar ones were constructed, and all horses and mules passed through them at regular intervals. They largely contributed to the suppression of mange, and the present writer has since urged County Councils to build and maintain such baths at suitable centres for the use of farmers and stock-keepers who would find it much cheaper to make a contribution towards the upkeep than pursuing the present method of each doing his own sheep-dipping with indifferent equipment. If our cattle men were once convinced of the advantages of dipping cattle there would be very little red water, mange, or sheep scab, in the districts where they are still prevalent.

RHEUMATISM, CRIPPLES, CROCKLES.

In the chapter on Lameness will be found some references to rheumatic lameness. The domesticated animals are also liable to general rheumatism, acute and chronic. The true nature of the disease is still somewhat obscure, but it is generally believed that it is due to the retention of waste products in the circulation, analogous to lactic acid. Experiments have been performed in which all the symptoms of rheumatism have resulted from the injection of lactic acid into the blood of healthy animals. Whether certain adverse climatic conditions prevent the elimination of this substance,

and interfere with the proper metamorphosis of tissue, or produce it, is not clear, but experience proves beyond doubt that rheumatism is more prevalent in damp and low lying situations than in high and dry places. Rheumatism in horses is commonly evanescent in character, and disposed to shift about from one limb or joint to another (*see* Lameness). Cattle suffer from it, some of the obscure hind leg lamenesses are due to it, which are rarely diagnosed. Pigs and dogs are the special subjects of muscular and joint rheumatism, and these animals are perhaps more liable on account of their habits and the mixed nature of their diet. It is observed among wild animals that the carnivora suffer, while the herbivora practically escape altogether. Cripples or crockles is a name given to rheumatism in cattle.

Symptoms.—These are often recognised by amateurs, so much do they resemble those of the human subject. Sudden pain and incompetence in joints; or gnawing pains accompanied with swellings and broken sleep, stiffness, cries or groans on being moved, feverishness, loss of appetite, dulness and stupor, scanty and high-coloured urine, constipation.

Treatment.—Dry bedding and good housing, warmth and clothing, farinaceous or milk diet, friction to parts affected with ammoniacal and other liniments (*see* Liniments and Embrocations). Internally, salicine or salicylate of soda is of the greatest value, and to be reckoned among the chief improvements in *materia medica* of the present generation. Prior to its discovery and use in this connection, the subjects of rheumatism very frequently suffered from thickening of the valves of the heart, due to deposition of fibrin during rheumatic attacks. Salicine has the happy effect of preventing this dreaded sequel of acute rheumatism, and may be prescribed for every species of animal (*see* Table of Doses).

Other diseases causing lameness and joint swellings are frequently attributed to rheumatism, but are due to the invasion of a specific organism (*see* Joint Ill).

Nitrate and bicarbonate of potash are prescribed in the drinking water, and iodide of potassium internally; while iodide liniments appear to be beneficial in certain cases. For the chronic rheumatism of old dogs, colchicum and soda or potash make valuable alternatives to the salicylates. Aloetic purges appear to benefit most cases in horses, and local blistering, with the object of "drawing out the rheumatic poison."

STRANGLES, FEBRA PYOGENICA.

Strangles is an infectious disease of colthood, characterised by the formation of abscesses which have a disposition to form between the lower jaws.

One attack usually gives immunity, and it is generally thought that very young colts suffer worse than three-year-olds and upwards. Secondary formations, due to infective pyogenic organisms, occur in other and distant parts of the body, as the glands of the shoulder, groin, and internal organs.

There is no age at which horses are altogether immune; old animals have a mild form of the malady known as "bastard" strangles, but it is not clear as to whether the special streptococcus is present in such cases. The infectivity of strangles varies in degree, in different years; so much so, that its communicability was sometimes doubted, before the specific organism was identified as the cause.

Symptoms.—Affected animals are noticed to be dull and not feeding, the usual signs of sore throat are present (*see* Sore Throat and Cough). There is a discharge from the nostrils, and more or less cough; the latter is sometimes very troublesome when the forming abscess presses upon the laryngeal region. The eyes are reddened and the temperature somewhat increased. There is a difficulty in swallowing, and more or less depression of spirits. An abscess forms in the glands between the rami of the jaws.

Treatment.—There can be no doubt that good nursing and pure air are the chief factors in recovery. If the former is wanting on most farms, the latter is obtainable without payment. Colts in late winter are often bunched up in a dirty old building where it is convenient to throw in some forage, but not to clean out or make any pretence at sanitation, and it is in such places that one meets with the bad cases. Better have no nursing at all than remain in such conditions; they will most likely recover if turned out, although losing flesh and being set back far more than if good attention could be given. When strangles attacks unbroken and unhandled colts it is not much use to prescribe a poultice to bring forward the abscess. This is but one of fifty reasons which could be given for haltering and handling foals from the first.

A poultice can be easily adjusted to the jaw if a colt wears a suitable head stall, or even a halter. Steaming the head where catarrhal symptoms are troublesome (*see* Bronchitis). For medicine two or three drachms of hyposulphite of soda daily in mashes of bran and linseed, and other soft moist foods (*see* Invalid Foods).

FIG. 2. STRANGLES.

With wild and unbroken animals the abscess may be once stimulated by a turpentine liniment, or white oil, but will not point as early as though poulticed continuously. It should not be lanced until fully ripe, and it is even doubtful if it is not better to let it break of itself, unless there is severe pressure upon the windpipe or larynx when it may be necessary to give room by opening the abscess or else perform tracheotomy to enable the animal to breathe (*see* Roaring).

While discharging, the wound should be cleaned and daily dressed with a disinfectant lotion. Once broken, or opened when ripe, the parts heal rapidly, and the patient usually picks up quickly. If debility follows the attack, half-drachm doses of quinine in the food may be given, or as a drench dissolved in one drachm of dilute sulphuric acid, and with half an ounce of tincture of gentian and half a pint of water. Tonic powders containing sulphate of iron and gentian root are also advised where youngsters must needs be fed from a trough and cannot be drenched.

TUBERCULOSIS.

The agricultural world has been almost as much exercised over this disease as the medical, and successive Tuberculosis Commissions have investigated, experimented, and reported. Each "finding" has been more pronounced than the last, and the infectivity of the disease and its intercommunicability between man and beast is generally accepted. Feeding experiments where pigs were given milk from cows suffering with generalised tuberculosis, or reactors to the tuberculin test which had no udder lesions, went further to prove the risks of infection by milk than all previous tests. The giving of human sputa or constant feeding of calves from cows with udder lesions were not very convincing performances, but the infection of healthy young animals through the milk of cows having no tubercles or morbid deposits in the mammary glands would seem to be conclusive evidence of free bacilli in the system of tuberculous subjects, and their presence in the milk in varying proportion. This at any rate is the essence of the last report, and drastic legislation may be anticipated. The conditions under which milk production and distribution will be permitted will, as do all new Acts of Parliament, curtail our liberty and enhance the cost of things. Dairy farmers will have to obtain higher prices and combine for the protection of their business.

There are hopeful signs of a diminution in the number of infected animals, as cow keepers come to recognise the undesirability of keeping them. A more general use of the tuberculin test would still further promote the cause. While the services of the expert are to be preferred, the master of a herd may acquire the necessary knowledge for his own purposes, although his certificate will be of no value in law. For this reason the subject is dealt with here, and an article which appeared in the *Farmer and Stockbreeder* is reproduced.

TUBERCULIN TESTING.

Cowkeepers often ask why they cannot undertake the testing of their own cows, and the answer usually given is that special training is required to appreciate the symptoms and go through with the test in a satisfactory manner, besides which the certificate of a veterinary surgeon has value, and the evidence of the layman has none in any case of dispute concerning the reaction to tuberculin. It may be said that the intelligent layman, who will exercise the same care as the expert, will arrive at similar conclusions if he carries out the test, and will make himself conversant with the conditions under which it should be undertaken, and follow the directions issued by authority. He should first understand what tuberculin is. The fluid sent out under the name of tuberculin does not contain tubercle bacilli, or it would be likely to produce tuberculosis. What it does contain is the products of the bacilli—their excreta and débris, to put it briefly and not too scientifically. These products are mixed with a dilute carbolic preparation. Why does tuberculin affect the animal into whom it is injected if it does not contain the tubercle bacilli, and why should it cause a rise of temperature in those affected with the disease and not in those which are healthy? I will attempt to answer my own question by asking the reader to consider for a moment quite another disease.

TETANUS OR LOCKJAW.

Suppose a broken knee into which the bacillus of tetanus has entered. In the lower layers of the wound the bacilli multiply, but they do not get into the general circulation; they cannot be found in the blood, but only in the deeper portions of the wound. The effects—the spasm and the locked jaw—are the results of the excretions of the bacilli; call them urine, if you will, or dung. These poison the animal, and produce the familiar symptoms of tetanus, more commonly called lockjaw, because the masseter muscles are

largely compromised, and the jaws opened with difficulty, or only very slightly. If the infected wound we have imagined is reopened and bottomed with powerful disinfectants the bacilli are killed, and the production of poison ceases. If the patient has not too large a dose already free in his blood he will then recover. In the case of the cow with tuberculosis there is a more or less acquired endurance of the products of tubercle bacilli. A certain amount of accommodation has been reached. The cells have grown accustomed to small quantities of this poison, and if the animal is free from chill at the time and not at œstrum, her temperature will be normal, but if you suddenly make a serious addition to the amount of tubercle waste (tuberculin) there will be a rise of temperature. Much experimentation was needed at first to find what the dose or quantity would be that could be given to a healthy animal without producing this inoculation fever, and many miscalculations brought the test into discredit. The explanation attempted above does not cover the whole of the case. In the tuberculous cow there is an additional and important factor, viz., that the subcutaneous injection of tuberculin seems to awaken latent tuberculosis, as when a gland is affected, but not active, or throwing off bacilli which will reach others and set up new centres. In the clean animal, then, the correct dose of tuberculin will not produce a temperature diagnostic of tuberculosis. In an animal with the latent form it will almost certainly do so. In an advanced case it will not prove reliable, because the blood is already so full of the poison that a little more or less will not materially affect the subject of experiment.

THE METHOD OF TESTING.

The following are the directions issued by the Principal of the Royal Veterinary College, London :—

"(1) While under the tuberculin test, cattle ought to be kept in the house, fed on their usual food, and protected from draughts. They ought not to be allowed to drink large quantities of cold water between the sixth and eighteenth hours after injection. It is well to take their temperature at least once on the day preceding the test.

"(2) The dose of tuberculin for a medium-sized cow is three cubic centimetres or fifty minims (drops), and it may be varied above or below that according to the size of the animal. Large bulls ought to receive four centimetres.

"(3) It ought to be injected under the skin with a clean hypodermic syringe. The most convenient parts are in front of the shoulder or on the chest wall behind the point of the elbow. The best form of syringe is one with an asbestos piston, as the whole instrument may be sterilised by boiling it in water for five minutes before use.

"(4) The tuberculin must be injected into the subcutaneous connective tissue, and care must be taken that the whole dose is introduced.

"(5) Ordinarily the temperature must be taken at the time of injection, and at the ninth, twelfth, fifteenth, and eighteenth hours afterwards. When there is any reason to suppose that the animal may have already been tested with tuberculin during the preceding two or three weeks, it is advisable to take the temperature at the third and sixth hours as well as at the times just mentioned.

"(6) Animals in which the temperature during the eighteen hours following the injection rises gradually from the normal (between 101° and 102°) to 104° or more, may be classed as tuberculous, and those in which it remains under 103° as not tuberculous. When the maximum temperature attained is under 104° but over 103°, the case must be considered doubtful, and the animal may be re-tested after a month.

"(7) The test is not reliable in the case of animals in the last stage of the disease, or in those in which the temperature is over 103° before injection.

"(8) The tuberculin should be kept in a cool place and protected from light. Should it become turbid or cloudy it must not be used.

"(9) The tuberculin test does not render the milk in any way injurious."

The tuberculin prepared at the laboratory of the Royal Veterinary College is only supplied to members of the Royal College of Veterinary Surgeons, as "the powers that be" do not consider it a proper thing to place in the hands of the public, but this view is not held by all cattle men, some of whom would like to make what they consider a fair and proper use of it to test their own herds, and, as usual, where questions of privilege are scented, others are ready to supply what the public desire.

Anyone who has read the directions above will see that trained observation and precautions are necessary to carry out the test, or the results will be altogether inconclusive. When every care has been taken to eliminate error a certain proportion of cattle leave the expert in doubt, and the tuberculin inoculation, like most others, is only a relatively good thing. In careful hands it enables us to do a lot of weeding, but a few seeds will always be left, and the elimination of tuberculosis from our herds will not take place during the life of the present generation.

Tuberculosis is defined as a specific disease caused by the bacillus of tuberculosis, which develops irritation, either directly or by formation of toxines, or in both ways. Nodules are produced of one or more descriptions of cells; exhibit a tendency to necrosis, followed by caseation, occasionally by calcification. The bacillus of one mammal multiplies in the bodies of other mammals. The milk from tuberculous cows infects calves and pigs, and it is believed that children are susceptible in the same way. This latter may be a legitimate inference, but there is of course no positive proof, as experiments have not and cannot be carried out under laws which recognise the sanctity of human life. If animals can be infected by man, it is argued that man can be infected by animals. We know that such is the case with some other diseases as the pocks (*see* Variola).

It is doubtful if the bacillus of avian tuberculosis is a distinct species. Tuberculosis occurs in man and all the domesticated animals; cattle, swine, and poultry are most frequently affected; horses stand next; sheep and goats are not so susceptible; dogs and cats still less so.

Tuberculosis of the lungs. This is the form in which two-thirds of the horses, cattle, dogs, and cats are attacked.

The mesenteric glands, the liver, and spleen are most often involved in horses, pigs, and poultry.

The joints of cattle, pigs, and poultry are often affected with tubercular arthritis.

Symptoms.—A variety of organs being subject to the deposits or tubercles, it follows that the symptoms are many and various. The symptom common to all is an unthrifty condition. A disappointing result in milk or meat in cattle, wasting and loss of spirits. Cough should always be regarded with suspicion, and the chest sounds carefully noted. Many cattle men think they can acquire the necessary knowledge without much trouble, but they are greatly mistaken. It takes a long time and much opportunity to make the veterinarian conversant with the sounds within, and able to assign to them their proper importance. A bad case may be diagnosed readily enough, for there will be sounds of frothy matter being drawn through the air tubes, and large dull areas where no sound at all is heard, while above them the

ordinary respiratory murmurs are exaggerated. By the time a case has reached this stage, it will be apparent enough in the loss of condition, and by the sepulchral cough, without the aid of auscultation. Diagnosis, to be of any real service, must be made early, and for this purpose we have in tuberculin a most valuable test; not an absolutely certain one, but still a very great aid.

Many cattle with tubercles of considerable size, and perhaps numerous, will put on flesh, and do in fact come to the block without suspicion. The farmer objects to guarantee the inside of a beast which he cannot see, and the butcher equally dislikes having a carcase confiscated which he has bought in market at a fair price. The presence of a tubercle on the chest wall need not cause the condemnation of a hind quarter, but on the other hand it may be a symptom of generalised tuberculosis. Since no one in this country eats raw beef, and cooking destroys the tubercle bacillus, the danger is very much exaggerated by those who would at once and without regard to large vested interests, make clearance of all animals reacting to the tuberculin test. We shall probably arrive at some sensible compromise between the extremists, as we usually do after disputations extending over a generation of men.

If tuberculosis is diagnosed before any clinical signs are manifest, it may be assumed that a beast will fatten for the butcher. Many subjects of this malady do well for a time, and latent tuberculosis, while unfitting the animal for breeding, need not disqualify it for food. Tubercles in the organs should not make a bullock unmarketable, although the scaremongers would have all carcases condemned that show any trace of the disease. It is in the later stages that wasting is seen, or in those animals in whom the intestinal tract is the chief seat of many and minute tubercles. Young stock—stores which turn out "wasters" or "skinters"—are commonly affected in this way, and diarrhœa is the prominent and almost constant symptom. The skin is dry and adheres tightly to the ribs, the hairs stand up, and though the animal may eat as well as the other members of the herd he gets poorer and poorer, or at the best makes no progress, and proves a loss to the grazier.

Treatment.—From what has already been said, the reader will have decided that prevention is the great thing to be studied: not breeding from cow or bull with the least suspicion of tubercular trouble, and, if possible, without hereditary taint. Cows which have developed lung tubercles should not again be stocked, but dried off and made up for the butcher: feeding only as long as they appear to be making up in flesh. In the case of Jerseys, they are seldom worth the cake they consume; they are not butchers' beasts at any time, and, if tuberculous, one might as well try to fatten a fagot stick. One and two-year-olds which are undoubtedly tuberculous had better be disposed of at once. This leads up to the difficult question of what one ought to do with them. If sent to market, some poor man, with faith in his own management, and a general belief that all other farmers starve their young stock, will buy them at a price, and suffer a grievous loss. Such beasts foul the pastures and perpetuate the disease. Tubercle bacilli have been found to be alive and virulent in naturally and artificially infected faeces, after it has lain upon pasture land for five months. "It is not yet clear whether at periods beyond this, their apparent disappearance has been due to the death of the bacilli, or to the fact that the greater part of the infected faeces had been washed away." They fill the buildings with the disease germs, and ought to be destroyed and buried deep in quicklime. Milk from suspects should be boiled; that from re-actors should not be used.

Mustard on the sides of the chest will sometimes benefit the pulmonary form, and nutritive food and tonics sustain the patient while an acute attack

resolves itself into the chronic. There are cases among animals, as among men, in which the tubercles cease to be active and infectious to the adjacent tissues. They become invested with a dense covering which cuts off communication with the rest of the organ, and in this state of imprisonment undergo a degenerative process which renders them innocuous, save perhaps in a small central portion. With these calcified tubercles an animal may appear to be perfectly healthy, but the tuberculin test will prove the contrary.

In the few examples of tuberculosis met with in the horse we can only hope, by generous diet, light work, and tonics, to tide over a time which will give nature opportunity to harden off and surround the tubercles in the manner above referred to.

Tuberculous joints in any domesticated animal may be blistered with iodine and painted with the tincture, with advantage. An atmosphere saturated with creosote or other disinfectant no doubt retards the development of the disease.

SWINE FEVER, RED SOLDIER, BLUE SICKNESS, MEASLES, SWINE PLAGUE, HOG CHOLERA, ETC.

There are three infectious forms of disease among swine which are commonly regarded as swine fever, and as these differ a good deal in their manifestation, it is not surprising that so much confusion prevails, and even experts contradict one another, since they are often describing quite different types of disease. Each of the three chief swine fevers has a specific microbe as its cause. There is the disease as recognised by the British Contagious Diseases (Animals) Act, and known in America as hog cholera; then swine erysipelas or mal-rouge (as known on the Continent of Europe); and swine plague, chiefly affecting the lungs and skin, but not showing the specific lesions of the intestines and spleen which we expect to find in the American hog cholera.

The pig farmer is not expected to diagnose, nor is the local veterinary inspector's decision accepted, until the viscera have been sent to the Board of Agriculture, and cultures of the bacilli have absolutely determined whether or not the expert was in the right. The owner of swine showing doubtful health should avail himself of the law, and call in the passing constable, who will report to his superior officer, who will report to someone else, and that someone reporting to the veterinary inspector, will get the latter's report, and all the reports will be reported to London, and a retired naval officer will be sent down to attend to matters concerning pigs, which a veterinary surgeon is not considered fit to attend to. What opportunities must there be on board a man-of-war for studying the administration of law in connection with pigs ashore!

We may not act for ourselves in the matter of swine fever. We may not doctor the sick, and if we conceal the fact of having disease we lay ourselves open to fine or imprisonment. The whole business is unsatisfactory, and will continue so until practical men have the management, and appointments are conferred on those showing special knowledge.

Great things are expected of the Ministry of Agriculture, but we understand that the old principle is to be maintained that experts are not to be employed in administrative duties. The veterinary inspector makes the diagnosis and an administrative officer without expert knowledge is sent to tell the pig owner how to use disinfectants! And we wonder at the great cost of the Government departments, which are ever being multiplied!

LOCK-JAW—TETANUS.

This disease derives its name from a common and prominent symptom, that of inability to open the mouth properly. Investigations prove that

it is always due to the introduction into the system of the specific bacillus of tetanus. It was formerly supposed that it might develop without any wound or injury, but the "idiopathic" theory is now out of date, and it is thought that some minute abrasion inside the animal must have admitted the organism, where no trace of the kind can be discovered outside.

It has been observed to follow all sorts of wounds, but punctured ones most frequently, and this is accounted for by the bacillus thriving best in the absence of air and light. In large and open wounds the conditions are unfavourable to its multiplication. It is also proved that in broken knee cases, when tetanus sets in, that the bacilli are found in the deeper layers. The bacilli themselves are not found generally distributed over the patient when a post-mortem examination is made, and it is supposed that their products give rise to the disease. Tetanus affects all the domesticated animals. It follows upon such injuries as pricks in the feet of horses, broken knees, docking, castration, etc. It resides in the soil of some countries, and of particular districts.

Lock-jaw is a very fatal malady, sometimes causing death in three days, and in others lasting over several weeks. The severity of the invasion is often such as to make it certain that the animal will die, while some are affected so lightly that horses have been put to work without the attendant recognising anything amiss. I have ordered more than one horse to be taken out of the shafts, with tetanus actually developed, and the driver at a loss to account for the animal's behaviour; never, of course, dreaming of anything so serious being the matter. Indeed it is quite a common thing for owners to look incredulous when told what is the matter. When following upon an external injury tetanus supervenes at a time when it is healing, but this is probably due to the period of incubation being somewhat the same as that in which a wound makes good progress. If the subject, whether horse, ox, sheep, or other animal, lives over the ninth day, there is ground for hope of recovery, especially if the wound has been disinfected down to its bottom, where the organisms chiefly reside. With their destruction, or by the antiseptic action of the agent employed, the prevention of any further reproduction, the poison already generated in the system expends itself, and is not renewed; so that, provided the first amount liberated is not a lethal dose, the patient may recover.

Symptoms.—A pinched or drawn expression due to continued spasms of the muscles of the head and face, the head raised, nose poked out, neck stiff and corded, mouth closed, or rigid, while not quite closed, the back looks hollow, and the tail is raised, and generally somewhat on one side. This peculiarity of the tail is diagnostic often, before the veterinary surgeon gets any nearer in his examination of the patient. The haw is prominent in the corner of the eye; or rather it should be said that the eye is sunken, which gives the appearance of the haw having come along in front of the globe. The animal wears a terrified look, and starts when touched, especially if a high-bred one. The respiratory muscles become involved, and then the chest is fixed and the flank tucked up. Although the symptoms related are usually gradual and progressive, there are intervals of comparative quiet succeeded by violent spasms brought on by the least sound, as that of handling a bucket. In these spasms the patient may fall down and die, or only get up again with the greatest difficulty, and after futile efforts in which he has contracted injuries. On the other hand, there are mild cases in which the patient is able to lie down, and apparently benefited by doing so. This is noticeable in bulls after castration; the bull which does not lie down may be booked as doomed to die. Whether horses, cattle, or sheep are the subjects of tetanus, they almost invariably retain their appetite and try to eat. One finds

them with food in the mouth which they can neither swallow nor let go, and we should take advantage of this to offer sloppy food which can be sucked up.

Treatment.—The late Professor Williams, whose experience of tetanus in horses was very great, advised putting horses into slings, because they so often injure themselves by getting down when in a fair way to recovery. When the muscular spasms subside, there is such flaccidity that they seem scarcely able to support the animals. Absolute quiet is desirable, and seldom obtainable. A semi-dark loose box, free from flies, and away from all other animals. To save him from noises it has been recommended to pour soft wax into the ears, but the writer has not seen this done. Only one person should visit the patient, and that not more than twice a day. Water should be given in a wooden vessel secured to the wall. Thin gruel, fresh made each time the nurse visits the box, should be left within easy reach— that is to say, on a level with the horse's chest, since lowering his head may bring on the spasms. Eggs whipped in milk will be drunk by some horses, and is a most desirable invalid food in this and many other diseases. Cattle and sheep may be tried with it also. If the entrance of the germs is believed to have been by a wound, that wound should be dressed to its greatest depth, with a 4 per cent. creolin solution, or one-in-one-thousand perchloride of mercury. This interference is likely to excite a spasm or convulsive fit at the time, but it is a less evil than leaving the bacilli undisturbed under the scab. Bran mashes and linseed to keep the bowels open should be given.

It is very doubtful if any medicines are of much use. Absolute quiet and the taking of sufficient nourishment to enable the patient to get through the critical time is the chief consideration. There are times when a veterinary surgeon in attendance might deem it worth while to give chloroform to subdue a violent paroxysm, but the application of a muzzle, or any form of restraint, militates against the use of this anæsthetic ; unless one is willing to pour it down by the pound upon the floor, and let it gradually overcome the patient, while watching from the outside. It is a notable fact, in giving chloroform to dogs and cats, that, if placed in a lethal chamber—a box with two compartments and two lids—if the animal is put in before the chloroform he will almost invariably sit, and become gradually insensible, without a struggle or effort to get out ; but if chloroformed with a muzzle, all animals fight against what we may assume to be a natural fear of death.

Sedatives, as chloral and the bromides of potassium and ammonium belladonna, and cannabis indica, are sometimes prescribed in large doses, administered either as electuaries placed inside the cheek, or as clysters per rectum (*see* Administration of Medicines). The prick of the hypodermic syringe will bring on a paroxysm, but an animal already in one may receive a dose under the skin with a more rapid effect than by any other means, unless it is by inhalation of chloroform previously alluded to. My own belief is that an animal will recover from a very small " dose " of tetanus, with or without treatment, and that he will die from a large one—with or without treatment, yet one would not leave undone anything which is believed to be beneficial.

An antitoxine or serum is prepared which is intended to protect from the disease. As a curative it is unreliable, even if obtainable immediately.

Lambs are particularly susceptible to tetanus after castration and docking. The number of ewe lambs affected will often prove as many as rams that have been castrated, and from this we may infer that docking offers even greater facilities for the entrance of the tetanus bacillus. As soon as symptoms appear, the dock should be shortened by a second operation, and a hot iron applied to the stump. If a male, the purse should be drawn open

and thoroughly washed out with a 5 per cent. chloride of zinc lotion, and the clot removed. Many cases will be cured if these directions are boldly and promptly carried out. It is but the application of the principle already advocated, namely, that of bottoming a wound and destroying the bacilli in their nest (*see* also Pricked Wounds in the Feet).

Joint Ill, Navel Ill, and Infectious Scour are specific diseases inasmuch as they are due to the entrance of particular organisms into the body, and might be added to the foregoing list, but it will be more convenient in a work of this kind, to consider them in connection with other diseases of joints, of the navel, and of the bowels.

Chapter II.

DISEASES OF THE HEART.

TEMPERATURE OF ANIMALS.

In the table following will be found the average normal temperature of the domesticated animals and poultry. In the diagnosis and treatment of disease the clinical thermometer plays a more or less important part. Its importance may be exaggerated, or may fail to attract sufficient attention, and its value can only be appreciated by those who read other signs or symptoms together with its indications. A very high temperature may be registered in the course of a few hours in connection with garget and descend rapidly next day, and the animal has been in no danger of death whatever, whereas two or three degrees less in pneumonia would look very grave, and two below that, if maintained day after day, might be expected to end fatally for the patient.

FIG. 3. CLINICAL THERMOMETER.

As a broad general rule, we may say that any temperature above normal is a cause for anxiety, and the longer it is maintained the more serious the trouble; that rapid rises are commonly followed by early declines; that a temperature of three or four degrees above the normal is more serious, if maintained, or only slightly varied morning and evening, than a very high register. A subnormal temperature is more to be feared than an increased one, as it indicates some devitalising process, as narcotic poisoning, hæmorrhage, or collapse. The so-called milk fever is a case of auto-intoxication, in which the blood pressure is reduced by a poison in the circulation, which has particular effects upon the brain, paralysing the central office, so to speak, from which instructions are sent to the heart and other organs, as well as muscles concerned in locomotion. The temperature is generally found slightly below normal, and falls considerably before death takes place.

Animal.	Fahr. Thermometer.
Horse	100–101
Cow	101–102
Sheep	103–104
Pig	102–103
Dog	101–102
Cat	100–101
Fowl	105–107

It is a very common error to suppose that, because diseases of the heart are more frequent among men, they are rare among the domesticated animals. An increasing knowledge of the diseases of animals goes to prove that they are even more frequent than veterinarians supposed. We might imagine that race horses and those called upon for the greatest amount of exertion would be the commonest subjects of heart disease, but such is not the case. It is a question whether the dog or the pig is the greater sufferer from disorders of the heart and blood vessels. The dog shows perhaps the greatest activity of any of the animals domesticated, and the pig, by force of circumstances, the least. The dog, like the racehorse, the hunter, and the trotting pony, is subject to those diseases of the heart which result from over-taxing that organ, but the pig, with nothing to do, and a predisposition to grow fat without disease, is specially subject to certain forms of heart disease, which can only be attributed to a rheumatic diathesis or disposition to that state of the body we call rheumatism, and to tubercular deposits upon the organ and its covering membranes, having the appearance of small cauliflowers. The latter are sometimes found on the slaughter of pigs that have not been observed to be seriously ill.

A distinction is to be made between functional and organic diseases of the heart. Indigestion or excessive exertion will bring on palpitation, or feeble heart action. Temperament or debility will account for irregular action, and these may be temporary and capable of cure or amelioration. Organic disease or alterations of structure, such as permanently interfere with the heart's action, belong to another category altogether.

INFLAMMATION OF THE HEART, CARDITIS.

The heart substance, a mass of involuntary muscle, can only suffer inflammation in some circumscribed portion without causing death. Portions of the heart may be injured (there were cases both in men and horses in the late war) without causing death at the time or subsequently. Pieces of wire and nails, needles, and other foreign bodies have left their marks in various parts of the heart without at the time causing death, or even subsequently, if they did not remain. Heart wounds generally prove fatal and quickly; the exceptions are mentioned because it has been thought impossible for the heart to sustain violence from without and not to result in immediate death.

ENLARGED HEART.

As a result of over-training in horse or hound, or over-exertion while untrained, or not in "condition," dilatation of the heart is met with. Such a heart is permanently weakened, but usually obtains accommodation, or the capacity to do ordinary work; it will serve the average requirements, but fail under special strain. This dilated heart is to be distinguished from a purely enlarged one. Training of the best kind will actually increase the substance and weight of the organ and add force to its impulse; the muscular walls will be thicker and the cavity proportionally enlarged, but a weak heart will not keep the proportions between walls and cavity. Health may be maintained so long as the animal remains in training, or in the highest state of muscular development, but when the individual ceases to keep up his "form" and lives a sedentary life, as when the athlete takes a public-house, and the racehorse goes to the stud, then comes the trouble; the over-trained heart slowly undergoes fatty degeneration; its walls waste, the cavity is enlarged, and the force diminished. It is a dilated and a weak heart too.

Only a few experts ever attain to anything approaching accuracy in the diagnosis or differentiation of these forms of heart change, but in a general way they make themselves known by palpitation, which does not cease when temporary causes such as indigestion or fright have passed away. A labouring heart may be due to some obstruction in the pulmonary vessels or the lungs (*see* Congestion of the Lungs).

There are diseases which leave heart troubles behind them, as rheumatism, influenza, azoturia, and other febrile affections in which the fibrin of the blood is arrested upon the valves of the heart, causing their thickening, and a consequent imperfect closure of the divisions.

PERICARDITIS, HEART WATER, DROPSICAL HEART.

The stout membrane which envelops the heart is called the pericardium; that which lines the heart, the endocardium. Inflammation of these membranes is described as pericarditis or endocarditis, according to which is affected. The South African cattle disease known as heart water disease is a form of pericarditis. Whether specific or from other causes, pericarditis may affect other animals besides the ox; the writer has seen it in every domesticated animal, and in a considerable number of wild animals in captivity. Having regard to the situation of the heart and its close relation to the lungs, it is not remarkable that many cases of pleurisy and pneumonia should be complicated by pericarditis and spread to the inner lining membrane. As a matter of general experience among cattle, we find both pericarditis and endocarditis coexisting in the same subject in nine cases out of ten. Lodgment of foreign bodies is one of the most frequent causes in cattle.

Symptoms.—The signs of fever which have been frequently referred to in connection with pleurisy, pneumonia, and other chest affections, will be present in an aggravated form where the membranes of the heart are concerned. There is, in addition to the ordinary pulse of fever, a peculiar irritability, a snapping, almost angry impulse, given to the finger when feeling it. At one time it will have this peculiarity, and at another prove feeble, fluttering, intermittent, and again bounding. Uncertain and irregular is the pulse of an animal with heart trouble. Sometimes muscular cramps of the neck and chest are observed in connection with inflammation of the heart membranes. Unequal and variable temperature of the extremities is one of the marked symptoms of pericarditis; cattle with lodgment of foreign bodies in the heart or pericardium so frequently displaying this peculiarity as to make it almost diagnostic.

Diseases of the valves of the heart, as previously hinted, are in most instances due to depositions of fibrin during febrile disturbances, and are difficult of diagnosis in animals. Angina pectoris, or the breast pang of human beings, is either non-existent in animals or so rare as to need no consideration here. However interesting to the veterinarian during life and upon post-mortem examination, the diseases of the heart afford but a very unsatisfactory study to the owner of animals, as he can neither hope to correctly diagnose nor cure them.

Treatment.—Although differing very much, heart troubles may be temporarily relieved by judicious management, and there is no doubt that many horses with imperfect hearts continue to do useful work, and cattle fulfil their destiny either as milk or meat producers. Palpitation, as a common sign of heart trouble, may be modified by doses of digitalis or strophanthus, by a laxative dose of medicine, by simple diet, and freedom from excitement —rest from labour in the case of horses, and restraint at home where a dog

is the subject. The more urgent symptoms subside under suitable conditions. There is a disposition, so to speak, to recover from any heart disturbance, save those produced by the presence of foreign bodies, or of such grave structural alterations as make efficiency impossible. The writer has seen both men and animals apparently beyond hope with heart irregularities, recover and resume their ordinary avocations and in the enjoyment of good health and spirits, and these examples have not been confined to the "soft handed gentry," they include navvies, and sailors who have been discharged from the service as incurable. "The heart is deceitful above all things," said the Psalmist, and if his knowledge of pathology was as great as it was of human nature, there would have been no need to qualify the statement.

Chapter III.

DISEASES OF THE DIGESTIVE SYSTEM.

IRREGULARITIES OF THE TEETH.

THE ORIGIN OF DISEASE.

DENTITION OF THE HORSE.

Age.	Incisors, Temporary.		Molars, Temporary.		Tusks.	Number.		
Period.	No.	Position.	No.	Position.	No.	Temp.	Perm.	Total.
Birth	4	Central	12	1st, 2nd and 3rd	—	16	—	16
4 to 6 weeks	4	Lateral	—	—	—	20	—	20
9 months	4	Corner	Permanent Molars.		—	24	—	24
	Permanent Incisors.							
1 year	—	—	—	4th	—	24	4	28
1 year and 9 months	—	—	—	5th	—	24	8	32
2 years and 6 months	4	Central	—	1st and 2nd	—	12	20	32
3 years and 6 months	4	Lateral	—	3rd	—	4	28	32
4 years	—	—	—	6th	4	4	36	40
4 years and 6 months	4	Corner	—	—	—	0	40	40

FORMULA OF TEMPORARY TEETH.

$$\frac{\text{M. } 3}{3} \quad \frac{\text{C. } 0}{0} \quad \frac{\text{I. } 6}{6} \quad \frac{\text{C. } 0}{0} \quad \frac{\text{M. } 3}{3} = \frac{12}{12} = 24$$

FORMULA OF PERMANENT TEETH.

$$\frac{\text{M. } 6}{6} \quad \frac{\text{C. } 1}{1} \quad \frac{\text{I. } 6}{6} \quad \frac{\text{C. } 1}{1} \quad \frac{\text{M. } 6}{6} = \frac{20}{20} = 40$$

FOOTNOTE TO ILLUSTRATION ON PAGE 34.

A.—Side view of skull of horse, showing full dentition.

B.—Colt at 15 months, showing temporary or milk, not deciduous, incisors.

C.—3 years old, showing first pair of incisors. (*a*) the deciduous ones well worn.

D.—4 years old, showing 2 pairs of permanent incisors. (*aa*) (*bb*) lateral deciduous incisor well worn. Canines (*a*) just coming up.

E.—5 years old. Central incisor broad, not much worn.

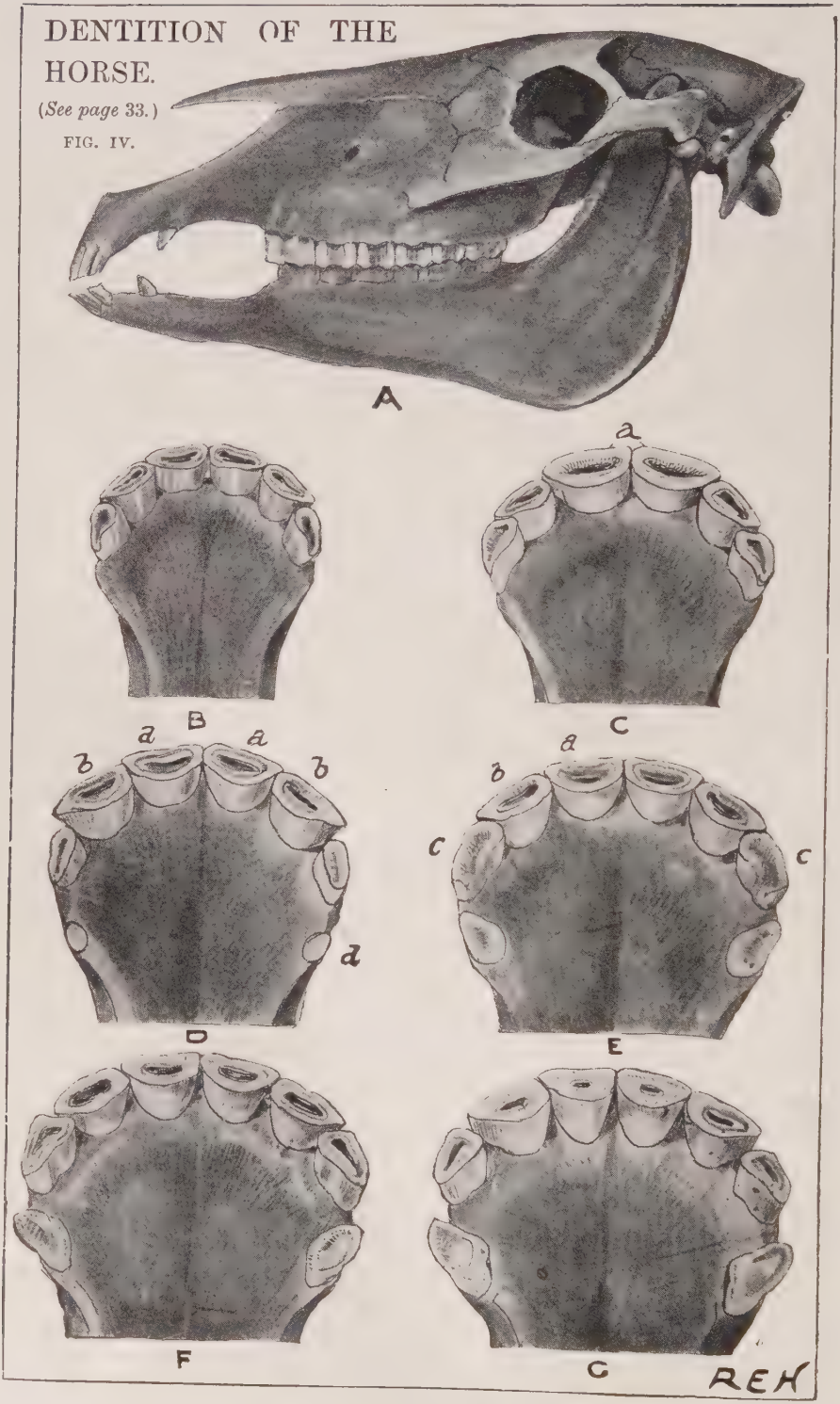
F.—6 years old. Mark in central incisor getting narrower, others showing near; canine well up.

G.—7 years. Mark in central incisor getting very narrow, reducing on median and lateral incisors; canines almost full grown.

DENTITION OF THE HORSE.

(*See page 33.*)

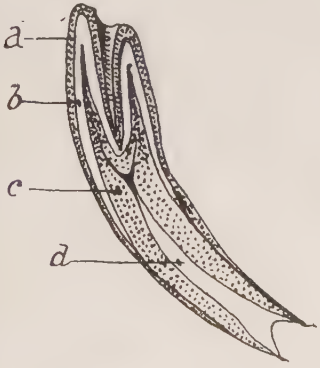
FIG. IV.



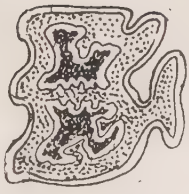
DENTITION OF THE HORSE—*continued.*

H.

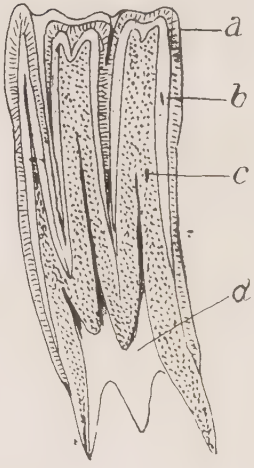
I.



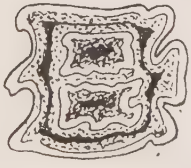
K.



L.



J.



M

R·E·H.

N

H.—Teeth at about 16 years; mark nearly out in centrals.

I.—Teeth at about 25 years; mark gone; yellow spot only showing; tusk triangular on section, long; canines long.

J.—Deciduous incisor of colt viewed from inside.

K.—Section of unworn adult incisor.
- *a.* Cement or crustra petrosa.
- *b.* Canal.
- *c.* Dentine
- *d.* Pulp cavity.

L.—Section of molar immediately below crown.

M.—Section of molar an inch below crown.

N.—Section of molar.

DENTITION OF THE OX.

Age.				Incisors, Temporary.		Molars, Temporary.		Number.		
Period.				No.	Position.	No.	Position.	Temp.	Perm.	Total.
At birth or soon after				2	Central .. .	—		20	—	20
				2	Central Lateral ..	—				
				2	Lateral	—				
				2	Corner	12	1st, 2nd and 3rd			
Early Period.		Late Period.					Permanent.			
Years.	Months.	Years.	Months.							
1	6	—				4	4th	20	4	24
1	3	—			Permanent.	4	5th	20	8	28
1	9	2	3	2	Central	—	—	—	—	—
2	0	—		—	—	4	6th	18	14	32
2	3	2	9	2	Lateral Central ..	8	1st and 2nd	8	24	32
2	9	3	3	2	Lateral	4	3rd	2	30	32
3	3	3	9	2	Corner	—	—	—	32	32

FORMULA OF TEMPORARY TEETH.

$$\frac{\text{M. } 3}{3} \quad \frac{\text{I. } 0}{8} \quad \frac{\text{M. } 3}{3} - \frac{6}{14} = 20$$

FORMULA OF PERMANENT TEETH.

$$\frac{\text{M. } 6}{6} \quad \frac{\text{I } 0}{8} \quad \frac{\text{M. } 6}{6} = \frac{12}{20} = 32$$

SHEEP.

Temporary Incisors.	Age when cut.	Temporary Molars.	Age when cut.
Central .. .. / Intermediate ..	At or soon after birth.	1st, 2nd, and 3rd .. .	At birth or a few weeks after.
Lateral .. .. / Corner	3—4 weeks.		
Permanent Incisors.	**Age when cut.**	**Permanent Molars.**	**Age when cut.**
Central	1 year 3 months.	4th	—6 months.
Intermediates	2 years.	5th	9—12 months.
Lateral	2 years 9 months.	6th	1 year 6 months.
Corner	3 „ 3 „	1st and 2nd	2 years.
		3rd	2 years 3—6 months.

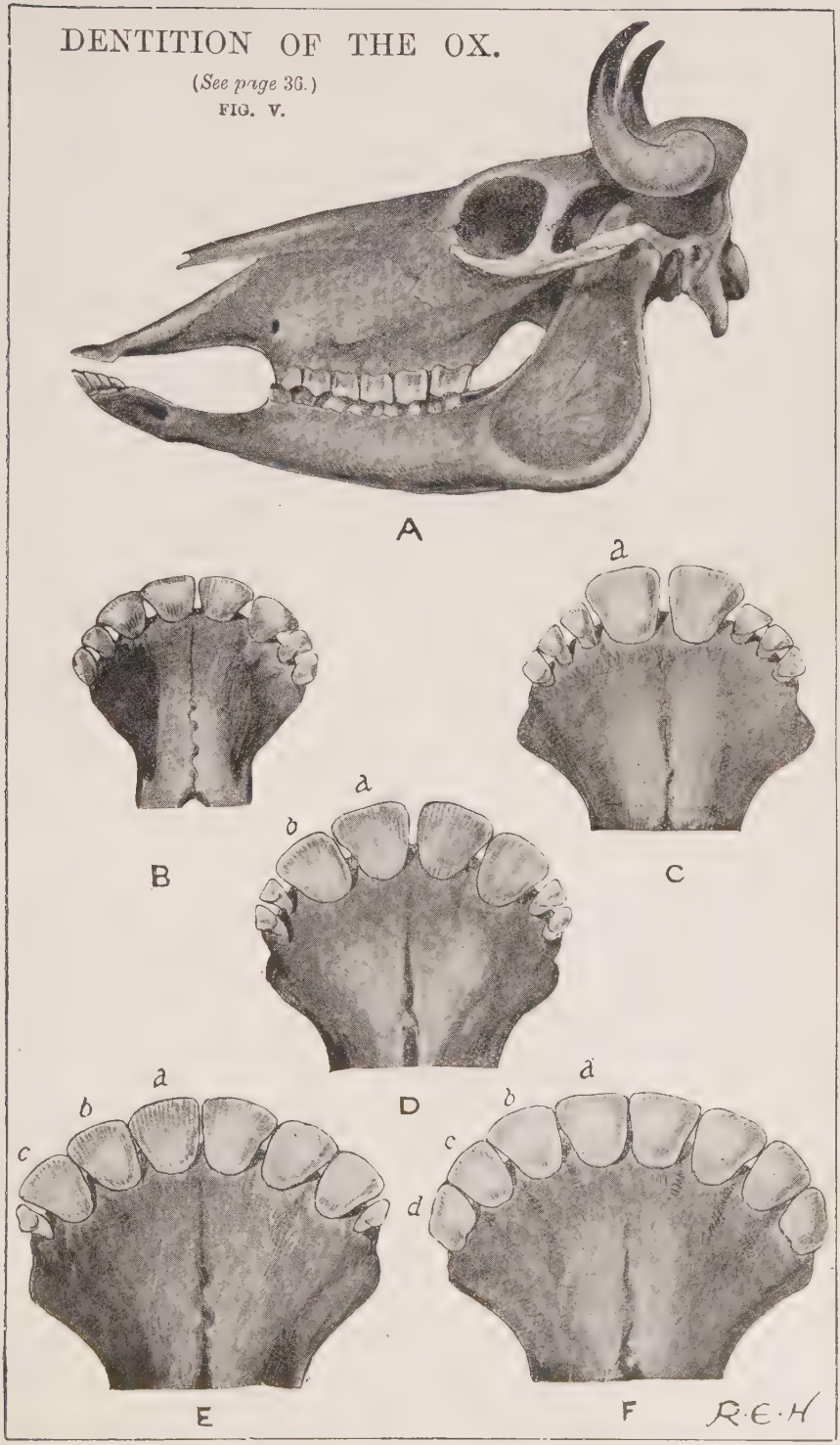
FOOTNOTE TO ILLUSTRATION ON PAGE 37.

A.—Skull of ox, showing adult series of teeth.
B.—Calf deciduous incisors.
C.—At two years.
D.—Three years
E.—Four years.
F.—Full mouth.

DENTITION OF THE OX.

(See page 36.)

FIG. V.



PIG.

Temporary Incisors.	Age when cut.	Temporary Molars.	Age when cut.
Corner	At birth.	1st, 2nd, and 3rd	4—6 weeks after birth.
Central	1—2 months.		
Lateral	3 months.		
Permanent Incisors.	**Age when cut.**	**Permanent Molars.**	**Age when cut.**
Corner	9—12 months.	Premolars	6 months (irregular).
Central	12—15 „	4th Molar	6 months.
Lateral	18—20 „	5th „	10—12 months.
		1st, 2nd, and 3rd	12—15 months.
		6th	18 months.

	No. of Temporary Teeth.	No. of Permanent Teeth.
Horse	4	40
Ox	20	32
Sheep	20	32
Pig	28	44

Perhaps the most frequent disease of the teeth in horses and cattle begins in the interdental spaces—the intervals between the fangs or roots of the teeth. This applies to incisors as well as molars. It will be observed that as animals grow old the teeth become narrower at the base or gum. The tooth is originally formed wedge-shaped, and grows up—passes up rather than actually grows—and the interdental spaces are therefore greater than in the young. Increased liability to the lodgment of food follows. Having no means of removing substances thus retained, the patient must needs endure what acts as a foreign body, and sets up irritation, first in the soft structure of the gums, and subsequently in the periosteum or covering of the bone of the jaw or alveolar process; the nutrition of the tooth or teeth is interfered with, and it finally becomes loose if its diseased condition has not attracted attention and led to its removal.

FOOTNOTE TO ILLUSTRATION ON PAGE 39.

A.—Side view of skull, hornless breed of sheep, showing full dentition.

B.—Dentition of lamb under 12 months, showing milk or deciduous incisors.

C.—Dentition of lamb at about 15 months.
1. Central pair of permanent incisors.
d. Median deciduous incisor.
b. Lateral „ „
c. Corner „ „

D.—Dentition of sheep at about 1 year to 18 or 19 months.
1 and 2. Permanent incisors.
b and *c.* Deciduous „

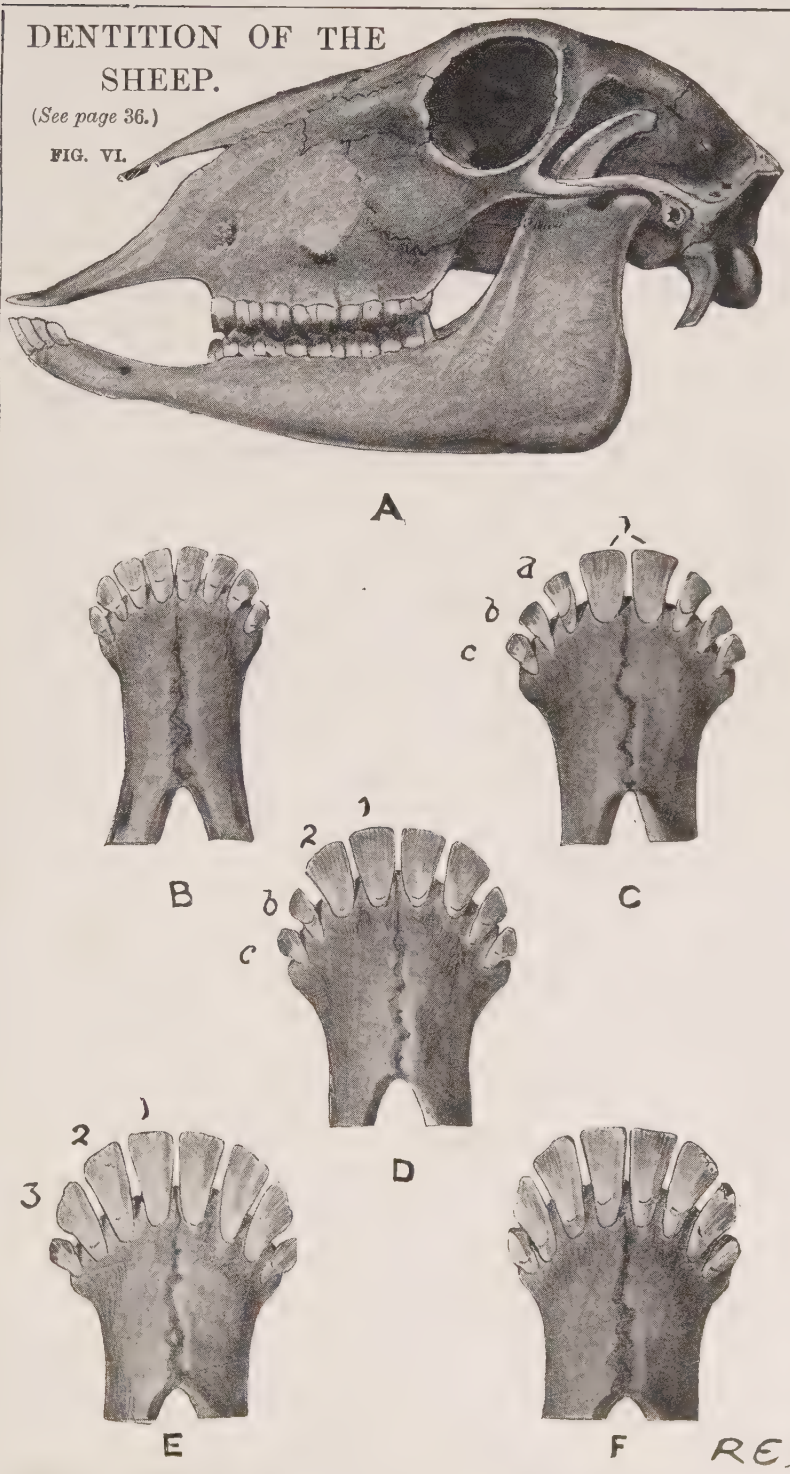
E.—Dentition of sheep at about 2 years and 5 to 7 months.
1, 2, 3. Permanent incisors.
c. Corner deciduous incisor.

F.—Dentition of sheep. Full dentition.

DENTITION OF THE SHEEP.

(*See page* 36.)

FIG. VI.



Before this was recognised it was always supposed that the tooth decayed from some inherent defect, or as the result of an injury (as biting upon a stone or nail), but upon proof being found of the frequency of alveolar disease preceding that of the teeth, it soon became an accepted faith that true caries, in the sense we know too well in our own mouths, never occurred in either horses or dogs. It is now ascertained that dry caries do occur, and there is, of course, a better prospect of recovery for a horse whose decayed tooth is extracted from a jaw not the subject of periostitis. Extraction is the only remedy, stopping being possible under special circumstances, but not of general utility, because, as above stated, a decayed tooth is nearly always a sympathiser with a diseased jaw, and a dissolution of partnership is likely to be beneficial.

IRREGULAR WEAR OF THE TEETH.

In a perfectly proportioned mouth and complete set of teeth, the whole grinding surface of the molars will be regular. If any portion fails to receive due attrition it will become too long. When a horse's teeth want filing, or "rasping" as it is usually called, it will be found that the outer side of the upper row and the inner edge of the lower are the parts needing attention. If the diagram showing the relative position of upper and lower molars is referred to the reason will be apparent. Some or all may have ragged edges. The teeth which more often need cutting down are the first molars, owing to the upper one being too forward, or the lower too far back, and failing proper attrition. A lower jaw too narrow, or imperfect use of the masticatory muscles, may be responsible for this. Severe bitting and the undue use of the bearing rein are contributing causes, and the writer has known permanent limitation of the range of movement of the jaws to be caused by habitual wearing of the face strap of the head collar too tight. In this connection I may be permitted to mention a case of supposed lock-jaw in a mounted infantry horse, which I *cured* by undoing the strap. As soon as rough edges on the teeth are formed the membrane of the cheek is liable to injury on the one side and the soft under part of the tongue on the other, in the act of rolling the morsels across the floor of the mouth. One can easily understand how a horse learns by experience of these sharp edges to limit the movements which cause them. He will not grind his corn so well, will swallow it imperfectly masticated, not having a proper portion of the salivary ferment in each meal, and so establish indigestion. This is frequently the case in old horses, whose owners seldom think of the equine dentist, but have recourse to medicines which fail of their purpose. Filing off the rough edges is an excellent remedy, giving immediate relief, but the operation will have to be repeated at no great interval.

PREMATURE WEAR.

In determining the age of horses one has to take into consideration the usual marks, the state of the infundibulum of each of the incisors, etc., but a

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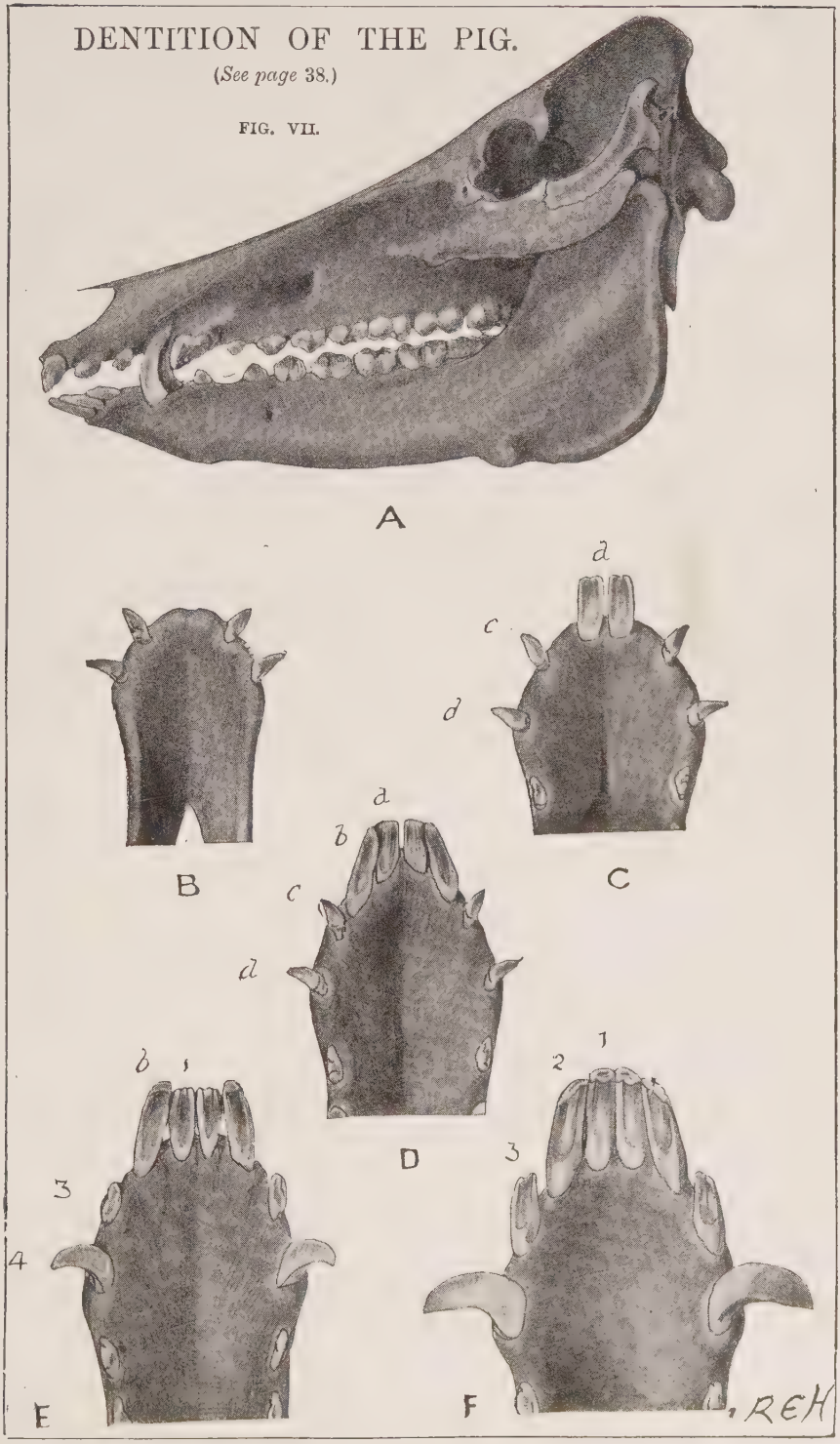
FOOTNOTE TO ILLUSTRATION ON PAGE 41.

A.—Side view of fully adult pig (sow).
B.—Dentition of pig at birth.
C.—Dentition of pig at 1 month.
a. The two central deciduous incisors.
D.—Dentition of pig at 1 to 3 months.
d. Central deciduous incisor.
b. Medial ,, ,,
Present at birth { *c.* Lateral ,, ,,
d. Deciduous tusk
E.—Dentition of pig at about 14 months.
1. Central permanent incisor.
b. Median deciduous ,,
3. Lateral permanent ,,
4. Permanent tusk.
F.—Adult permanent dentition.
1, 2, 3, 4 { All permanent teeth. Central and medial incisors showing wear.

DENTITION OF THE PIG.

(*See page* 38.)

FIG. VII.



thoroughbred horse encouraged to eat hard corn at the earliest possible moment will have made more progress at four or five years than the farmer's horse which was subsisting almost or entirely on grass when the racehorse was making his reputation. In addition to wear induced by premature hard feeding, there are individuals whose teeth are naturally soft from hereditary or acquired disease. There is what is known as the " smooth mouth," a condition due to the softness of the enamel. In compound teeth, such as solipeds and ruminants all possess, the layers of enamel are harder than those of dentine, and an irregular surface like a miller's grindstone is thus always maintained ; but when it happens that the enamel has not the required resisting power the wear becomes even, and a smooth surface of very little use is the result. If a very old horse's mouth is examined this will be found smooth, although not level, as the enamel does not extend to the deeper layers of the tooth which have in extreme age attained to the surface or crown. Old horses in this condition are to be found at fairs, when they have been filled out with summer grass or fed up on boiled foods, and " planted " on the unwary, only to be repurchased for a trifle and sold again at another place. The humane owner will feed such animals on crushed corn, linseed cake, bran, meal, carrots, etc., if the animal is otherwise fit for service.

FISSURING.

Molar teeth, especially the fourth, in horses are liable to split or form fissures, beginning at the crown, and at first, and possibly for life, of no great importance ; sometimes these fissures open wider and extend downwards. Biting on fragments of nails and such like hard bodies, which have a way of getting into the most carefully sifted oats, may cause the rift in the first instance. If they extend into the alveolus, fragments of food and the action of the salivary fluids set up the disease previously described as alveolar periostitis, and the whole tooth has to be extracted sooner or later. The crown of a tooth may be broken, or a piece off either side, without necessarily causing decay, as such an accident invariably does in the human subject. If the corresponding tooth in the other jaw does not grow too fast and into the space, time will rectify the matter ; those teeth which are opposed in grinding will maintain a certain level, while the injured one, which will meet with no such attrition, will overtake the general level, provided, of course, it has not been injured below a certain non-vital point. On account of the disposition to accumulate particles of food and set up fermentation and decay, it is usually best to remove a tooth that is much injured. The absence of a tooth does not necessarily invite the opposing one in the other jaw to penetrate the space, because the teeth are not exactly opposite, *corps à corps*, as the French say, but the row of grinders in the upper jaw may overshoot by half a tooth or more those of the lower, and *vice versa*. Although in the normal mouth the teeth form two nearly straight lines or rows of grinding surfaces, they diverge somewhat at the back. Measuring from the premolars of one side to that of the other, in the upper jaw, the average distance in a medium-sized horse is about $4\frac{1}{2}$ inches, while the under jaw at the same place gives a space only of about $3\frac{1}{8}$ inches. The movements in masticating food are chiefly lateral, hence the comparative rarity of injury from an unopposed tooth entering a space made by extraction. An experienced veterinary surgeon will estimate the risk by the " set " of the jaw he proposes to operate upon before advising extraction. The illustration shows the normal position while at rest.

Colts of one and two years old are generally recognised as less liable to give trouble than those between three and four and a half years. One of the reasons is to be found in the teething. There is also frequently at four

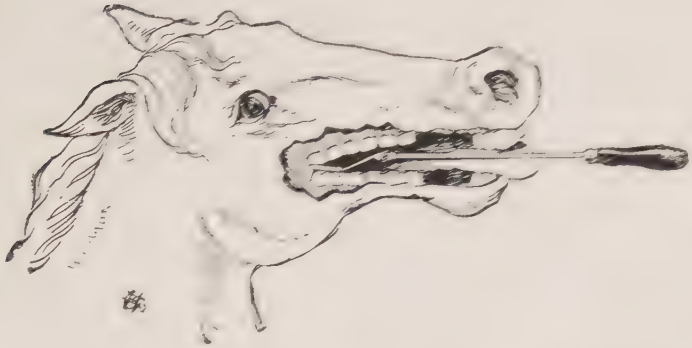


FIG. 8. "H.D.R.D. PROGRESSIVE" RASP IN USE ON BACK LOWER AND UPPER MOLARS.

FIG. 9. H.D.R.H. DOUBLE REVERSIBLE DU[illegible] RASP PLATE.

years a troublesome cough. A lot of changes are then taking place in the mouth: the third molars are being replaced by the permanent ones, and the sixth is breaking the gum. More or less irritation of the gum attends teething in all animals, and a greater or less area of the surrounding soft tissues is involved, but in the case of the sixth molars, so near the throat, it is not surprising if a cough is set up by extension of the irritation from the back of the mouth to the fauces and larynx. It is most noticeable when the colt begins to eat his breakfast. It is a loud, long cough, pointing to the seat of irritation, not a soft, deep one such as accompanies broken wind or any other diseases affecting the lungs.

Where there is a cough there is not the teething fever presently to be described, but there is a looseness of the bowels, amounting in some cases to diarrhœa. This is more often due to swallowing food improperly masticated, and therefore irritating to the bowels, than to overdoing the animals with mashes and linseed, as the anxious attendant supposes. This cough, in the racing stable, is regarded with the greatest dread, as in hereditary roarers it may lead up to that calamity, but in animals not predisposed it may be said to be attended with no special danger.

Treatment consists in carefully regulating the diet and waiting the progress of teething: linseed tea, cut grass if stabled, very little bran, and that thoroughly soaked. The best regulator of the stomach and bowels, if there is a bad smell either accompanying the defæcations or from the breath, is sulphate of soda in doses of half an ounce to two ounces. Sponging the irritated gums with a weak solution of borax or of alum is also helpful.

DENTITION FEVER.

A febrile condition associated with teething, if not actually caused by it, has been observed and described by the father of veterinary surgery in this country (Percivall), and by the great French veterinarian Hurtrel d'Arboval, who says: "A sort of local fever originates in the alveolar cavities, running high or low according to the resistance the teeth encounter from the hardness of the jaws, of their own disproportionate size and solidity. The gums become stretched from the pressure of the teeth against them; they dilate, sometimes split; at the same time they are red, painful and hot." The dental nerves suffer compression, and reflect their irritation in such a manner as to account for the febrile disturbances which take place at this, the most critical, period of a young horse's life. Colts between three and four years of age are even less capable of bearing fatigue than those of yet tenderer years. This was noted during the Boer war, when our quondam enemy had to impress youngsters of only two years, and found them "stay" rather better than three year olds. Very little treatment is desirable, but a return to natural conditions of life as far as procurable, such as turning out to grass, and in very much congested gums a few superficial pricks of the lancet.

Carnivorous animals, as dogs and cats, are well known to suffer from teething fits, and it may possibly be found in the light of further experiment that "shivering" is connected with dental troubles.

WOLF'S TEETH AND SHYING.

Diseases and bad habits, supposed to be constitutional, are many of them due to irregularities of the teeth. Among those which have been distinctly proved may be named blindness, shying, pulling to one side, weak eyes, wasting of flesh, suddenly stopping short; and it is believed that some jibbers first contracted the vice by reflex nervous effects, having their origin in dental troubles.

How common is the belief that so-called "wolf's teeth" induce shying! It is not always clear what owners mean by wolf's tooth, but the generality refer to a small irregular molar in front of the upper row of grinders. Veterinary surgeons regard any supernumerary tooth as undesirable, but the recognised authorities either evade the subject or else refuse to believe that these extra teeth can be the cause of shying and other defects of sight or diseases of the eyes. The late Professor Williams, whose "Veterinary Surgery" is still the standard English work (improved and revised by his son, of the Liverpool University), says, "They can produce no inconvenience; but if requested to remove them the practitioner can hardly refuse," and then proceeds to cast doubt upon his own assertion by referring to the fact that "the dental nerve is a branch of the same nerve as that supplying the eyes with common sensibility, namely the fifth." The non-professional reader will distinguish between "common sensibility" and the nerve of special sense—the optic which arises from the base of the brain near the fifth, but whose office it is to pass into and spread over the back of the eyeball, and send messages to the brain describing the objects reflected upon the retina. We know that when one of the nerves of special sense is injured, its fellow is very likely to suffer by sympathy, and the one-eyed man lives in dread of losing the other. There are, too, plenty of examples of sympathetic failure in one of a pair of common nerves. "Nowadays," says Williams, "the supposition (that moon-blindness was caused by wolf's teeth) is not carried quite so far, and the utmost that can be said is that the irritation of teething may be an exciting cause of ophthalmia in animals whose constitutions are hereditarily or otherwise predisposed to the disease; and the removal of supernumerary teeth, lancing the gums or withdrawal of offending teeth, may very possibly be followed by some remission of the ophthalmic symptoms." This grudging recognition of the possibility was the attitude of mind that most of us held towards the client who came to us, assured by some horseman that his animal would be benefited by removal of wolf's teeth, and it was long before the writer had an opportunity of anything like a conviction as to its benefits. I was never more beautifully "taken down" in my life than by a Somerset farmer who brought a seven-year-old mare to me to remove wolf's teeth. I was very busy, and expressed myself bluntly as to the inutility of the operation. It was a market day, and some farmers came along during the performance, one of them offering a wager with me that the mare would be cured. I accepted readily enough, as at that time I was fuller of collegiate instruction than practical experience. The mare came to market every week afterwards, and was never known to shy again, although she had been one of the worst sinners previously. A coincidence, shall we say? It may be; but that would hardly apply to two other cases equally well known to the writer.

AN EXCESSIVE NUMBER OF TEETH

Is comparatively common in children, and not rare among horses. Gobeaux tells of a case in which a horse had just double the number of incisors (nippers); while supernumerary molars have been noted by Gunther, Stockfleth, and others. It is probable that more cases occur than are ever heard of, as the average horse-owner does not look at his horse's teeth, or ask an expert to do so, unless something is observed to be amiss with the animal. The ever-curious and minutely observant German likes to accumulate statistics of these and cognate matters, and our most recent information is derived from the Fatherland. Freidberger and Frohner say that the commonest site for a supernumerary molar is behind the third molar, and it may occupy an objectionable position alongside, protruding into the mouth and irritating the tongue on the one side, or the cheek on the other. The primary or "milk"

teeth are sometimes caught and fixed between the second or permanent. This is noticeable in dogs.

The writer has operated upon quite a number of Pomeranians with a complete double set of teeth, taking out a dozen or so at a "sitting," until the supernumeraries were all extracted.

In cattle the fang or portion of tooth below the gum may have been quite absorbed, but the crown may not have fallen out as it should have done, and this is how it becomes fixed between new teeth on either side, setting up irritation and preventing the animal from properly masticating its food. This condition was more common during the evolution of the Shorthorn, when early maturity had not attained its present position, and the period of dentition in the now improved breeds had not been materially shortened. There are several months' difference in the eruption of teeth in the most advanced breeds, as compared with the old Longhorns, and some others whose breeders have not followed more or less on the lines of the early Shorthorn men.

DECAYING TEETH.

Animals so affected are observed to do badly, and even merit the description of "rotten" among a population proud of being "men of few words." A very bad odour from the mouth is a further reason for so describing such animals. When any animal is noticed to be dribbling or dropping its food after taking it into the mouth, a careful examination should be made. The tongue should be secured by a hand dipped in dry meal, and pulled out to its fullest extent, and turned up sideways. This will enable one to get a fairly good view if alternate sides are so handled, and if it is found that teeth require removal a veterinary surgeon may have to be called, with proper appliances to remove them; but there are many handy cattlemen who could, with pliers and pincers or other tools, at once relieve a young animal of a crown which is merely held too tight for the movements of the tongue to dislodge. The symptoms of dental trouble are not always so marked as to include dribbling of saliva; the beast may do no more than grind with great caution, interrupt himself in the middle of a mouthful, and hold his head somewhat on one side. Horses and cattle with bad teeth will often retain a half-masticated morsel in the cheek, causing it to bulge, both of its own bulk and an accumulation of saliva. Not grinding food that is there and grinding the teeth when no food is present both point to dental trouble. Horses or cattle which have lost a tooth should thenceforward receive periodical examination, as an unopposed tooth may go on growing, and finally pierce the opposite jaw. Cases of supposed nasal gleet have been caused by a lower molar growing up into the space from which an upper has been extracted, and, meeting with no substance hard enough to resist its progress, has finally pierced the maxillary sinus, and given rise to a discharge from the nostril of that side.

DISEASES OF THE DIGESTIVE SYSTEM.

Digestion begins in the mouth and ends only in the expulsion of waste from the intestinal canal. Every part of the process is of interest to the farmer, and, to some, the last part will be more important than the first. Those readers occupying poor land will apprehend my meaning at once, for many poor pastures have been made fertile by "new men upon old acres," who have placed stock upon the land and fed it, through the cattle and sheep placed thereon.

A knowledge of digestion and of the chemistry of foods should be part of the mental equipment of every farmer, since the chief end of his work is to convert plants into animals.

To the want of this knowledge must be attributed a very large proportion of the illnesses of animals, and the loss instead of gain resulting from their maintenance.

Abundance of suitable food may be placed before an animal and he may be quite unable to make use of it. If the lips of the horse, or the tongue of the ox, are incapable of performing their office, the food cannot be prehended and conveyed to the mouth. It would seem unnecessary to mention these facts, if one did not see horses starving from paralysed lips, bullocks with " wooden tongue," and dogs and cats with loose teeth preventing them from eating. Many questions reach me asking " what to do with a beast that isn't thriving " and requesting some medicine. The owner in all such cases should carefully examine the mouth, the lips, tongue, teeth, cheeks, throat, and the character of the fæces passed. The latter will often point to improperly masticated food, and this again directs our attention to the teeth or maybe the tongue, which cannot roll the food on to the grinders.

DISEASES OF THE LIPS.

Eruptions upon the lips of horses, cattle, sheep, and other animals may be due to external and comparatively trifling influences, or be symptomatic of some specific or constitutional malady. The bladders or vesicles which come upon the inside of the mouth in connection with foot and mouth disease may be seen sometimes on the lips as well (*see* Foot and Mouth Disease, page 7).

An eruptive disease about the lips and muzzle of lambs, which is called " wild-fire " in some districts, is very infectious and has been mistaken for foot and mouth disease. There is a little febrile disturbance with it, and a few doses of salts and soda bicarbonate are advisable, besides the application of a strong solution of alum thickened with honey, and smeared on the parts.

BLACK SPOT OR NECROBACILLOSIS.

Since the earlier editions of this work were published there has been a widely spread trouble among all sorts of animals from the invasion of an organism known as the *bacillus necrosis*. Sores about the muzzles of all species of domesticated animals, at first isolated but rapidly multiplying in number, and not infrequently coalescing, cause much discomfort and hinder feeding. In some instances they pass inside the mouth and result in great destruction of tissue. This organism is the same one that is responsible for what is known as " quittor " about the pasterns of sheep. The muzzle may be infected by rubbing it against the already affected leg ; or the reverse may take place. Calves suffer from destruction of the inside of the cheeks, and the first symptom observed is often a bulging with food that has become lodged and decomposed.

Treatment.—Whether upon the lips, muzzle, or limbs, inside the mouth, or upon the teats and udders of cows, ewes, sows, or other animals, measures must be taken to destoy the organisms before any hope of cure can be entertained. Scraping the black scabs away and clearing off all matter, even to making a deep raw wound, is desirable rather than leaving any possibility of a breeding remnant. Nothing has been found better than a strong solution of iodine, say, of the proportion of one in sixteen of methylated spirit, and made soluble by the addition of twice the amount of iodide of potassium. Applied on alternate days a cure will soon be effected, unless in some foot cases the destructive bacillus has penetrated to the joints, when it is hopeless.

SORE LIPS, STOMATITIS.

Sores upon the lips of horses are frequently due to a condition of the stomach known as stomatitis, and correspond to those puffy swellings upon our own lips which break and pass away when the fit of dyspepsia has ceased. Similar eruptions occur in the case of sheep, rarely in cattle, dogs, or swine.

An infectious stomatitis among horses sometimes assumes a rather serious character, the affected animals slavering to a considerable extent, but not showing any appreciable rise of temperature or any great leisons beyond the little eminences about the muzzle and a patch of red membrane inside the mouth. They are first found as vesicles, but very quickly break and coalesce and form the sores above alluded to During one period of the war, when horses were badly wanted on "the other side," we had a few very mild cases of stomatitis in the South Camp at Swaythling Remount Depot, and two or three squadrons of five hundred horses each were detained for weeks at a cost of many thousands of pounds to the country. A few occurred in the North Camp, of which the writer had veterinary charge. Feeling sure it was of the mild variety, they stood at the end of a line apart. They soon recovered and no spread of the disease followed.

The lumps or pimples vary greatly in character, sometimes containing a watery fluid, at others pus ; occasionally contagious, especially in sheep, and in some instances they are parasitic.

Treatment.—For all practical purposes they may be treated *en bloc* as one ailment of no very alarming kind, save for the possibility of being infectious and causing loss of time. Separation of affected animals on the first appearance of an eruption will in any case be advisable. The mother's milk and udder should receive attention too, as the malady may pass from dam to offspring, or *vice versa*. If no specific and removable cause is found, the affected ones may be drenched with a saline aperient suited to the species and age of the animal—Epsom or glauber salts for horses, together with nitrate of potash or bicarbonate in the drinking water (*see* Table of doses), and for lambs a small dose of castor oil, followed by two or three teaspoon doses of carbonate of magnesia daily, or a proportionate amount of fluid magnesia. The sore places may be dressed with borax and honey, as made for children, or with chlorate of potash one part, glycerine five parts, water twenty parts. If any of the broken pustules leave a ragged ulcer, it may be touched up with a 10 per cent. solution of nitrate of silver. Although the sores upon horses' lips seldom cause them much trouble, it is well to treat them as infectious, and not allow a change of stalls, or intercourse over the partitions. Dressing with a lotion of permanganate of soda or potash, or with a 4 per cent. wash of creolin, will have the advantage of a disinfectant and a healer at the same time. Soft food easy of assimilation should be offered.

QUIDDING, DRIBBLING, SLAVERING OR SLOBBERING.

By the above terms in different districts is meant the discharge of ropes of saliva, and dropping of the half-masticated food from the mouth. The food may be dropped without the salivation, or the reverse may be noted.

The cause is generally but not always to be found in the mouth ; the exception being in chronic or acute gastritis, or the presence of nests of worms in the lining membrane of the stomach, and obstruction of any part of the gullet.

In young animals dentition troubles should be suspected and the mouth examined. A loose tooth or a crown partly displaced, and from which the fang has been absorbed, will account sometimes for slavering and indigestion and quidding (*see* Decaying Teeth). A very fetid odour accompanies the breath of animals in whose mouths decomposed food is retained. Quidding and dribbling occur as the results of abrasions of the membranes of the mouth or tongue, and specific eruptions, and from any injury to the latter. Swelling or inflammation of any of the salivary glands also causes an excess of saliva and overflow. Quidding and slavering, then, must be regarded as symptoms of something to be sought and remedied, and not as a disease itself.

INJURIES TO THE MOUTH AND TONGUE.

The lips and tongue are frequently injured by falls, blows, bad bitting, splintered mangers, and nails in walls : dogs and cats being specially liable to wounds incurred in eating. Fish bones and those of game and poultry, small mutton chop and cutlet bones, are partly broken up and portions become wedged between the molar teeth or still further back in the mouth.

Injuries of the tongue or within the oral cavity are disposed to heal rapidly with but very little assistance, the fluids of the mouth apparently facilitating the process.

Treatment.--Removal of the cause and rest will in most cases effect a speedy cure. Horses with hard mouths are often found badly bruised by the bit, and sore angles to the mouth are caused. Such animals should have leather or rubber-covered snaffles, in which they will often (not always) go without pulling. In this connection one may point to the folly of smearing bits or the corners of the mouth with blistering agents, with a view to restraining pullers ; it only makes the parts less sensitive when the irritation has passed, and the skin thickened as the result. It is seldom necessary to use stitches for any injury to the tongue or inside of the mouth ; wounds in this region will heal if the animal is fed on soft foods which cannot effect a lodgment and retard union. If a portion of tongue or membrane is disposed to slough away, there will be a fœtor of the breath and slavering. This may be ameliorated by a mouth wash of four per cent. of alum, or boracic acid, or permanganate of potash, but alum has a special influence upon mouth abrasions, and the writer remembers seeing, in the days of foot and mouth disease, which he treated, great ulcers healed in two or three days by it.

LAMPAS, PAPS, BARBS.

When horses drop their food (quid) the attendant too often jumps to the conclusion that the animal is suffering from lampas or swollen gums of the upper jaw immediately behind the incisor teeth. This condition may arise from teething troubles, from indigestion, or unsuitable food, and seldom calls for interference. A cooling dose of medicine may be needed, or, in the case of an old horse, some accumulations between the teeth may require removal and the gums washing with an astringent lotion, such as recommended above. In a few cases the lancet, judiciously employed, will effect reduction, but nothing can excuse the barbarous custom of burning the palate still practised in remote districts, where it does not appear yet to be known that such performances bring the operator within the law for cruelty to animals. Lampas should act to us as a warning to inquire what is amiss with the animal's teeth, feeding, or management.

PARALYSIS OF THE LIPS AND TONGUE. MULES' BAD CORNERS AND HARD MOUTHS.

A dropped lip or partially paralysed lower lip is not infrequently met with in very old horses and others in extreme poverty. It also occurs among younger animals compelled to wear heavy and ill fitting bridles, or carrying plumes and funeral trappings which press upon the trunks of nerve which go to supply the lips.

We have seen it caused by twitching the lower lip to restrain a restive animal while being clipped.

If one side only is injured the lip of that side only will drop, and give a peculiar puckered appearance to the animal. When both nerves are affected, the whole lip will be implicated. It is not only a serious disfigurement, but the sufferer cannot seize his food properly, and may be observed thrusting his mouth down upon the floor of the manger and dropping much of his food, until necessity has taught him to use his incisor teeth and tongue in a way not intended by nature. Ruminants, it will be remembered, prehend their food with the tongue chiefly; pigs, dogs, and cats with their teeth, the two latter employing their front teeth more or less, but with the horse a loss of prehensile power in the lips is a serious matter.

Treatment.—Allow no pressure from bridle or head collar, and, if kept in a stall, use a neck collar or strap round the throat. The food should be soft, or at least made damp enough to hold together when fed from a deep and not too long manger.

A mild blister, as one part of biniodide of mercury to twelve of lard, applied over the cheek muscles, and repeated in a month, should be tried, special care being taken to prevent the animal rubbing himself during the action of the vesicant. Recovery usually takes place with this treatment, and it is probable that tonics assist after a purgative dose of aloes. An inability to keep the tongue in its place, that is to say, lying on the floor of the mouth, is noticed in some horses; in toothless old dogs and occasionally in other animals it is found hanging out on one side and partially dry. It is the cause in dogs of a particularly offensive odour. Injuries from the bit, from ragged teeth, from falls and blows, and diseased glands account for most cases in horses, and if we substitute stones and sticks for bits, which dogs have been allowed to carry, the same may be said of dogs. In the latter we have known it to result from biting the tongue during fits. Cattle get paralysis of the tongue, but it does not show in the same way; in them it is almost invariably due to the disease known as actinomycocis, which see. The tongue is commonly shortened when more or less paralysed or "wooden," and inability to deal with the food is a prominent symptom.

Treatment.—Unless the trouble can be traced to abscess in a gland, to actinomycosis, or other specific cause capable of removal, there is no treatment which can be recommended for paralysis of the tongue. The teeth should in all cases be examined.

DISEASES OF THE PHARYNX.

That portion of the throat between the back of the tongue and commencement of the gullet which is called the pharynx is liable to many of the troubles which have been referred to in connection with the mouth, such as thorns and splinters of bone and other objects getting imbedded in its soft structure. It has, too, the disadvantage of being beyond the control of the tongue, and a pellet of food or a medicinal bolus which has once reached this portion must be swallowed except by some expert old cougher who knows the exact moment when to eject it. This is the part most affected when an animal has a "sore throat." If the soreness extends inside the corresponding portion of the

respiratory tract it is then known as laryngitis, or inflammation of the larynx, but the two often exist together under the common appellation of sore throat and are considered under diseases of the respiratory system. Roaring in cattle is generally due to a post pharyngeal abscess and may be broken by a finger nail

CHOKING.

Any obstruction occurring between the back of the mouth and terminal portion of the gullet is spoken of as choking. No species of animal is exempt from this accident, not even the dainty-feeding cat. The obstructions most often met with in the pharynx or first portion are commonly such as have sharp points or ragged edges, which afford attachment to the membrane, and permanent lodgment occasionally takes place in what are known as the guttural pouches, establishing an abscess of painfully slow formation, and more often than not becoming inspissated or granular rather than soft and ready to rupture during certain movements of the animal.

Dogs and cats are more frequently troubled in this way than vegetable feeders, and splinters of bone, fish bones, hooks, pins, needles, and other foreign bodies introduced with the food or taken into the mouth in play, are not infrequently lodged in the pharynx. Horses, cattle, and sheep less often get an obstruction in the pharynx, and for this reason persons seeking to relieve them are apt to forget that the obstruction may be high up and removable with the hands, if the mouth is gagged or otherwise held open. Greedy feeders are naturally those most likely to get choked, as they do not comminute the food, and, in the absence of pulping or cutting machines, large and irregular pieces of mangel or other roots get lodged in the gullet.

Symptoms of Choking.—Most animals show alarm and distress. Horses and cattle arch the neck and the muscles are thrown into spasm, the mouth is partly opened, frothy saliva dribbles from it, and the tongue may be obtruded. The trouble is generally diagnosed, even by those without experience of it. Any doubt may be dispelled by pouring some fluid into the mouth, which will be returned if the patient is choked. Horses show the greatest amount of fright, and are on the whole the most difficult subjects to deal with when choked. Cattle will become resigned to the inconvenience after a time. Dogs will seek a human friend, as a rule, and attract his attention. Cats, after a few savage movements and pawing at the mouth, retire into a corner and await results with that peculiar desire to be left alone and without sympathy which a smitten member of the feline tribe usually displays.

Treatment.—With a long experience of choking in every kind of domesticated animal, I would impress upon the reader the importance of not being in any hurry. Choking, in the sense of something "gone the wrong way" into the windpipe, is very dangerous, and often fatal in a short time, but choking, as we ordinarily understand it, calls for no instant and heroic treatment. Most of the fatal cases I have seen in horses and cattle have been brought about by rash interference, such as the employment of a flexible cart-whip, or other rough instrument as a probang.

It will always be a safe proceeding to give a little oil, linseed or olive, with quiet firm handling, so as not to increase the natural alarm, and endeavour to locate the lodgment. It may be in the top of the throat, or at the stomach end, or in any part of the tube. It may be possible to seize it and withdraw it, if the mouth is gagged open.

If the obstacle is only a little beyond our reach, or in the first third of the gullet, we may try what the pressure of both hands will do; one on either side of the channel, and directing the force upwards; or assist its downward movement, if bulging midway down the channel of the neck. The probang

should not be passed until two or three lots of oil have been given, as this will often suffice in itself to enable the patient to swallow the object. Horses have a much smaller gullet than cattle, and a smaller instrument should be employed taking care also to lubricate its point and smooth off any irregularities. The gags supplied both for horses and cattle are not necessary, and less opposition is encountered where they are not used. If the mouth is held open and the probang passed quickly over the back of the tongue, there is very little opposition to the rest of the proceedings. There are two points to be kept in mind : one is to reach the obstruction without violence, and the other is to carry it on by one steady continuous push until it reaches the stomach. If there is much resistance, the attempt should be abandoned and more oil given, waiting for an hour or two before again passing the instrument. It often happens that a very little movement induced by the first application makes room for the next dose of oil to lubricate the passage, and the obstruction is easily moved on at the next attempt. If it is not, still more time should be given, as cattle do not die from choking, but, as before remarked, are frequently killed by injuries to the membrane or muscular substance of the tube. Some substances may be helped down when seen bulging the neck by stroking, squeezing, and otherwise manipulating the obstacle gently. Pieces of turnip become softened and yield by themselves very often without interference. Hens' eggs given whole by grooms are occasionally arrested in the gullet, and these may be carefully broken from the outside. Choking is not always caused by hard solid bodies ; it may be a quantity of hay, imperfectly masticated and greedily swallowed, or, in the case of animals which have been previously choked and injured by rough treatment, there may be saculation of the tube. I am amused now to think that the very first horse I ever owned, after affixing M.R.C.V.S. to my name, had this defect. I bought him at grass, and only discovered it when he had been in the stable a day or two and got choked. With him, as with many others, time alone was needed to effect a cure, and a probang might have gone into the sac and easily broken it, with a fatal issue. After an obstruction of the throat or gullet, the patient should be fed on soft stuff, as bran mashes and linseed, for a day or two. The obstacles which give rise to choking in dogs and cats are usually more solid, as bones and foreign bodies, and the probang is less often used. If the object cannot be reached by opening the mouth and pulling the tongue forward, it may perhaps be felt, and if a pin or a fish bone, carefully cut down upon and removed from the outside with a very small wound. We have the advantage with carnivorous animals that they can fast for a very long time without injury, and a surgical wound in the gullet will most likely heal so well in a couple of days that the patient may take milk and eggs or thin milky puddings without opening the orifice. It is always possible, either with them or with the larger animals, to sustain the sufferer with clysters. So little does an injured gullet affect cats and dogs that a fish bone not infrequently comes through and forms an abscess under the skin.

INFLAMMATION OF THE STOMACH—GASTRITIS.

The stomach bears more abuse than any other organ, and will deal with a variety of food, and even tolerate foreign bodies, without much resentment, as a rule, but there are times when it becomes irritated by indigestible substances, by poisons, and by specific diseases. Parasites form nests in the mucous lining, and bots attach themselves to the stomachs of horses, in such numbers as to occasionally set up serious irritation. The gastric and peptic glands, imbedded in the substance or walls of the stomach, are liable to derangement also, and attacks, either of acute or chronic gastritis, are not

rare in animals—horses, dogs, swine, and cats suffering more frequently than cattle or sheep and other ruminants.

Symptoms.—In the horse will be found under the heading of Impaction of the Stomach, for in that form only is acute gastritis met with. A chronic form is noted, in which the chief symptom is a discharge of frothy and tenacious mucus from the angles of the mouth, loss of condition, and unthriftiness, with occasional eructations. Cattle are liable to show gastritis in the form of fardel-bound or impaction of the fourth stomach. Pigs, dogs, and cats are subject to acute attacks in which vomiting and much abdominal pain are evinced, and perhaps purging follows. The dog or pig stretches itself upon the ground with all four legs distended, as though deriving comfort from the coolness of the floor, but when the disease has advanced this attitude is commonly abandoned for one of despair, in which the animal sits and sways or rolls over on its side. The vomit, at first only frothy or yellowish with regurgitated bile, becomes presently fetid and streaked with blood and broken-down tissues. Death results from gangrene. Acute gastritis in dogs is a frequent condition in so-called canine influenza.

Treatment.—The cause should be carefully sought, and, if possible, removed. The food should be examined, and a change made in it. Horses and cattle are generally benefited by a course of bicarbonate of soda and calumba (*see* Table of Doses). The acute gastritis of dogs and cats is best treated with ice water and sedatives, such as hydrocyanic acid and morphine, bismuth and soda, avoiding purgatives, but relieving the bowels with enemata of soap and water or glycerine, and the application of warm flannels or poultices to the abdomen. The food should consist of milk and thin gruel, then farinaceous puddings, and by slow degrees a return to the ordinary diet, great care being exercised to avoid bones or indigestible food of any kind. The brain symptoms (stomach staggers) of cattle and horses will be found under the Diseases of the Brains.

CONSTIPATION AND IMPACTION OF THE STOMACH AND BOWELS.

This condition may profitably be considered together with engorgement of the large bowels or impaction and distension from the presence of gases. They all arise from indigestion in one or other of its many forms, and are of first-rate importance to the horse-owner and stockman, for, with imperfect digestion, the horse's usefulness is impaired and stock will not thrive. Impaction of the stomach in the horse arises from too great quantity being taken in too little time, or from the quality being such that the viscus cannot deal with it. For example, we may take the hillside colt in a hard winter, filling himself to repletion with woody innutritious fibre, in the absence of better food, and the stabled animal with nothing to do and abundance of corn and hay, which he is encouraged to take, that he may look big and be "above himself" when shown outside. Experience has taught us and experiments have demonstrated that the digestive system can accommodate itself to almost anything, provided the change is not sudden. If this were not so, we should have a great many more fatal cases of indigestion than we do; or, it might be said, men would have learned better how to manage animals. Much indigestion is caused in the same way as choking (*see* Choking), namely, by imperfect mastication and want of the first act of digestion—insalivation in the mouth. Horses with defective teeth, or of greedy temperament, bolt their food in large quantities, and, if not choked, introduce into the stomach a mass of food which requires of that organ the work which should have been done in the mouth. Cooked food is a frequent source of indigestion in horses also, as it is swallowed without the natural ferment (*ptyalin*) in the saliva permeating it, and setting up its own peculiar action. The animal goes on eating

cooked food after he has taken enough, which he would not do had he been compelled to grind it. This can at any time be proved in one's own person; eating slowly brings the sense of satisfaction with a less quantity of food than does a larger amount hastily swallowed.

An occasional cause of impaction of the stomach, more particularly of the ox, is to be found in the presence of foreign bodies. The morbid appetite which will induce cows to swallow boot soles and perambulator aprons, bunches of keys and pocket knives, may precede or follow on indigestion. That they do swallow, both by accident and intent, all sorts of things which cannot be digested, readers are probably aware, and that, as it is chiefly among cows, the morbid appetite is sometimes associated with the generative system.

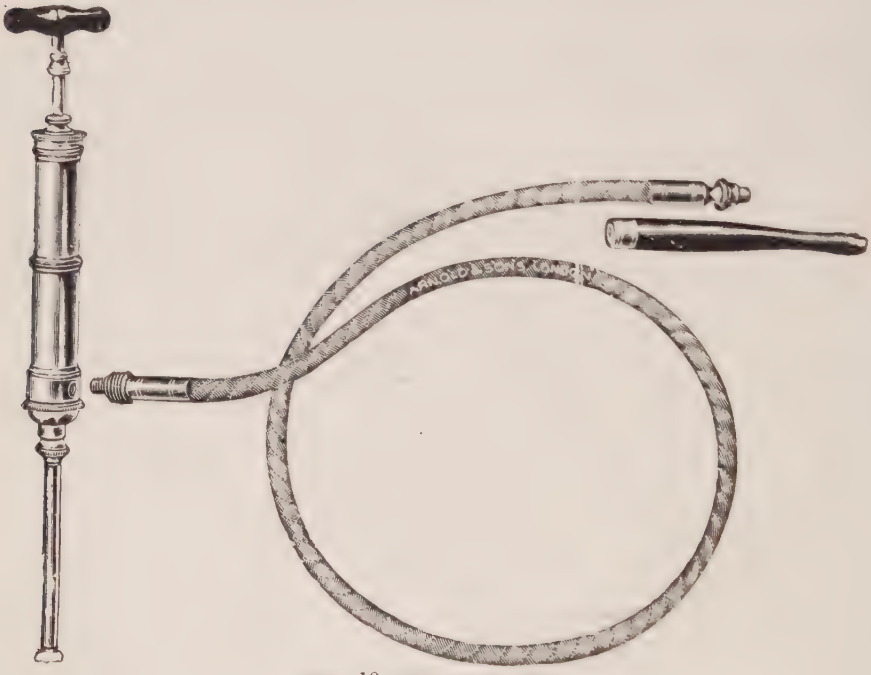


FIG. 10.—ENEMA PUMP.

CONSTIPATION AND STOPPAGE.

A hard condition of the fæces by which they are passed by abnormal effort is spoken of as constipation, and is commonly due to the dry and innutritious nature of the food or to absence of water and the need of exercise. Actual stoppage may occur from no other cause but more frequently from the formation of balls on intestinal concretions. Constipation in most cases must be considered to be due to bad management, and the treatment should always be directed to supplying a laxative diet and not frequent purgings by means of drugs. These may be used in case of necessity, but should not be resorted to habitually. Repeated doses of linseed oil or castor oil and linseed mixed; or copious draughts of Epsom salts in the proportion of one part to ten of water, and injections *per rectum* of the latter; of glycerine undiluted, and of soap and warm water. Obstinate constipation must not be treated with one excessively large dose of medicine, but the whole intestinal tract be softened gradually by the accumulated influence of the medicines given.

This specially applies to repeated small quantities of oil. The reader is referred to Impaction of the Stomach, and to Troubles of the New Born, where infantile constipation is considered. Also Colic and the Chapter on Purgatives.

WOOL BALLING AND HAIR BALLS.

The formation of wool balls in lambs is a frequent source of serious loss to the flock master, and every precaution should be taken against it. The balls are found to be mixed with partly digested food, and, like all concretions of the stomach or intestine, seem to attract and roll together any indigestible substance that may be present. In very young lambs that have died of tetanus or some quite distinct disease, I have opened the stomachs and found these things beginning to form ; just a few strands of wool crossed in different directions and a curdle adhering. One may find a few such fibres in the dung at most times if it is taken and washed and filtered, but where digestion is active and uninterrupted, and no very great quanitity of wool swallowed, no harm comes of it.

The symptoms are much like those of colic and stomach staggers ; sometimes the lamb scrapes with one foot, and gets away from his fellows ; at others he is found blown and standing with drooping ears and more or less loss of consciousness ; bewildered and miserable, he soon succumbs. Cases are often overlooked, and only the death of one or more lambs calls attention to the subject. Constipation is not noticed in one individual in a flock, and by the time the shepherd finds a lamb standing apart and blown the mischief is often beyond repair.

Treatment is not always successful, but repeated doses of linseed oil usually give the best results, as they keep down gas and the distension which results from it, and soften the balls and lubricate the passage. In Cornwall the custom is to give a raw sprat or small pilchard, pushing down the throat as a bolus ; the idea being that the bones will carry away some of the wool or disintegrate the mass. The compact nature of these wool balls after death makes it very doubtful if such action be produced, besides which the gastric juices easily dissolve fish bones. If it were not so there would be few persons to eat fish, for none of us can avoid swallowing bones when we do so. Prevention is the thing to be aimed at. The ewe flock should be clatted or clipped of the wool about the udder and under the tail, so that lambs should not involuntarily take in some wool, and afterwards acquire a liking for it, as we are assured by many observant flock masters who have seen lambs picking loose wool off hedge-rows.

Hair balls, from the habit of licking one another, are more frequent in young animals, and stones (*calculi*) in maturer ones. A piece of nail taken into the stomach with cake may form the nucleus around which a large calculus is formed. These substances may at any time become a source of danger by getting fixed in a fold of intestine, and setting up inflammation or totally blocking the canal. In horses they form in large numbers, and may have no more solid nucleus than an oat hair or barley beard. It is probable that in such animals the intestinal juices habitually contain in solution those materials of which common calculi are built, and that no special nucleus is necessary. There is a predisposition to precipitation of salts on to any substance that may happen to be present. A somewhat similar thing is observed in the mouths of some carnivorous animals, particularly dogs ; a deposition of so-called " tartar " upon the teeth which, by analysis, is found to be very nearly allied to the commoner forms of bowel and bladder stones.

If impaction, distension, colic, or acute indigestion, shown in other ways, is due to these bodies, treatment will be less likely to succeed, although stones

are often passed in great numbers, and animals die of other diseases, and are found to have had immense stones within them which have apparently given no trouble during life.

Symptoms.—Distension of the belly, flatulence, colic, grunting on being moved, standing with listless look, loss of appetite, pawing or scraping. These are common to all animals of the farm, but horses, young or old, are subject to a sort of mental paralysis, and in some cases delusions, from chronic distension with innutritious food (*see* Stomach Staggers, and Sleepy Staggers).

Cattle more often show impaction in the form of hoven, blown, or blast, when the rumen or paunch is the seat of the trouble, and its acute form is more frequently associated with indulgence in green food than in winter when fed on dry stuff chiefly. Clover, more than any other substance, is provocative of the blast or hoven, and young stock, breaking bounds and getting into a good growth of clover in the morning while wet with dew, often pay the penalty of death before they are discovered and treatment attempted.

Impaction of the fourth stomach in ruminants is slow in its manifestation of symptoms. A little loss of appetite and dulness of spirits, a grunt at the end of each expiration, perhaps some tympany or distension of the belly. The dung in this complaint is very deceptive, as it may pass away in a thin stream almost involuntarily, and deceive the attendant by its liquidity, if he is not observant enough to notice the whole quantity is quite insufficient for an animal in health. A liquid lane running between walls of hardened material is here represented, and by and by, when aperients are given, masses of hardened matter of the contour of the large bowel are evacuated. Without relief the grunts previously alluded to become groans, the temperature rises, the beast wears an anxious expression, blows, champs the mouth, grinds the teeth, and finally succumbs to inflammation.

Treatment.—Aperients, clysters, aromatics, digestive helps: all of these may be needed, but careful consideration should be given to each case. We may give a five or six drachm physic ball to a draught horse we know to be filled up with offal, hay, and straw, but we must not treat the brood mare in the same way, or we risk abortion. It is sometimes thought that a too severe purgative acts by driving the obstructive mass into a position in which it becomes immovable; certainly one sees such cases post mortem without being able to prove whether they were so before the physic was given, or as a result of it: for this and other reasons it will be wiser to attempt the removal of a mass of ingesta by repeated doses of linseed oil, of treacle, or of salts. Linseed oil in doses of from ½ pt. to 1½ pts. may be given to horses or cattle, and a wineglass to half a pint to sheep, and repeated in a few hours, until rumbling movements are heard from the outside, or the altered outward appearance gives some assurance that the mass is being reduced. If one waits for actual purging, instead of watching for the signs just mentioned, an overdose may be given. Some animals will best respond to salts, given in large quantities of warm water, and others will be more easily influenced by oil. A good plan is to give both by turn, and treacle of the old dark variety, to act as a ferment in the dry winter cases. Not very much benefit appears to result from giving warm injections per rectum in cattle, but they may be tried, and back-raking is also to be practised.

Horses will in most cases be helped by enemata of soap and warm water, and the mere fact of unloading the rectum will often give early relief by permitting the escape of gases and making room for the movements of the bowel further forward.

HOVEN, BLOWN, BLAST, TYMPANITIS.

This form of indigestion is so acute and dangerous that every farm hand should know what to do immediately, whether a veterinary surgeon is sent for or not. It is a pitiable sight for the practitioner, when he arrives an hour or two after getting a message, to find two or three promising youngsters dead, and others *in extremis*, all because there was no one with a sufficient knowledge of first aid for animals to help them. As soon as the blown beast is discovered, he should be given a pint of linseed oil, unless he appears ready to fall and suffocate, in which case one's pocket knife or any other handy instrument should be plunged into his left side, mid way between the last rib and the point of the hip—the part which so plainly shows, and still more plainly proves on pressure of the fingers, that there is no solid resistance. It should be borne in mind that a bold stab causes less pain and less after trouble, than a feeble, funky pricking, at the spot, or first dividing the skin, and afterwards the abdominal muscles, and puncturing the paunch by two or even three separate efforts. The wound should be large enough to let out a volume of gas, and kept open by the fingers until some sort of tube can be obtained. A stick of alder from which the pith has been pushed, or a penny whistle pipe, a short length of gas pipe, or any other tubing which will give escape to the gas, will afford immediate relief. It must not be understood that such crude implements are recommended, save on the principle of "any port in a storm." In my opinion every stockkeeper should be provided with a probang and puncturing instrument for hoven (trocar and canula), and these things should

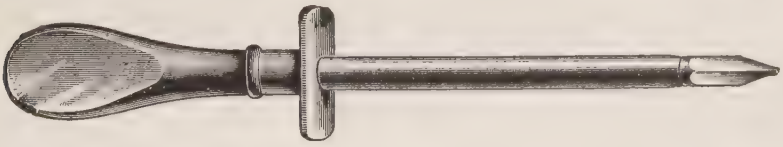


FIG. 11. BRUCHER'S FLAT-POINTED TROCAR (*Huish*).

be kept where the carron oil and carbolic oils are placed, and known to every farm servant in case of choking, hoven, burns, or cuts occurring to animals or their attendants.

Oils have the effect of masking gases, dissolving, absorbing, or preventing their elimination from the fermented ingesta which give rise to hoven, and many times have I arrived at a farm only to find my intended patient recovered, by a simple pint of linseed oil given while waiting. A second or third dose may be advisable and a probang passed (*see* Choking), by which latter often a large amount of gas will escape if the instrument is not quickly blocked with ingesta. Aromatic spirit of ammonia (sal volatile) in one ounce doses given in a quart of water may decompose the gas in some instances, but it should not be administered with or immediately after oil, which it saponifies. Ginger, turpentine, cayenne and peppers—all the so-called aromatics and direct stimulants, are at times helpful in treating cases of hoven, but they are more in requisition for such as recur, or are only temporarily relieved by the treatment above named (*see* Table of Doses). Careful dieting, and such tonics as gentian, caraway, and aniseed, with a little bicarbonate of soda or potash, may help to restore distended and distressed organs (*see* Table of Doses, &c.).

RUPTURE OF THE STOMACH.

This fatal condition is by no means rare in the horse. The symptoms are sudden trembling, more particularly of the fore limbs, profuse sweating,

extreme prostration, staggering, looking round at the flanks, hurried breathing, and more or less successful attempts at vomiting. Vomition in the horse was at one time thought to be absolutely diagnostic of ruptured stomach, but it is occasionally seen in connection with ruptured bowel or diaphragm and with old injuries of the gullet (*see* Choking, Saculation of the Gullet, &c.). The experienced veterinary surgeon may diagnose rupture of the stomach, but the same train of symptoms accompany most serious ruptures of the abdominal organs, and post-mortem examination will alone prove the exact nature of the lesion.

COLIC, GRIPES, FRET.

With the exception of a few hereditary subjects of colic it may be said to be due to indigestion in one or other of its many forms. Veterinary surgeons recognise two chief varieties of it, although, as a matter of fact, there are so many as to have induced one individual to write a book on the "Common Colics of the Horse." Spasmodic colic, as the name implies, in a spasm or painful contraction of some portion of the bowel, commonly the small intestine. The muscular layer which is between the mucous lining and serous investment, contracts violently, and the animal suffers great pain, It is sudden in its invasion, as a rule, or slight symptoms may go unnoticed by a careless person.

Causes.—Improper food, too much of it, excessive exertion, drinking largely of cold water, impaction, concretions, calculi, worms, &c. A frequent cause of colic is the withholding of water until the thirsty animal has eaten his feed and cooled down. This was the custom in coaching days, when it was discovered that deep draughts of cold well water induced colic. Provided the water is about the same temperature as the air, a horse is refreshed by drinking before feeding. The water passes out of the stomach in the time it takes to sift and prepare a feed, and the animal's salivary glands are thus enabled to secrete more saliva and prepare for digestion in the mouth. If any reader is unwilling to accept this explanation as good enough, he may satisfy himself by inquiring into the number of colic cases in the Army and in large working studs before and since the custom was changed.

Symptoms.—Sudden discomfort and interruption to eating or work, or whatever the animal may be doing at the time, pawing with the front feet, scraping the ground with them, striking at the belly with the hind ones, looking round with an anxious expression, crouching as if to lie down, and rising again as though uncertain what to do, going down and rolling, groaning, stretching out on the side, assuming a half-rising posture and falling back again. The patient may rise to his feet and sigh, look into his manger and resume feeding as if only momentarily interrupted; he will likely enough cease feeding while yet his mouth is full, and go through the same performance again as previously described. The duration of colic is very uncertain, but failing to get relief horses die apparently of collapse or inability to bear this kind of suffering. It is customary to say that they die of inflammation, of enteritis, of all sorts of sequelæ, and they do, but there are dead horses which show no lesions beyond the constriction of a portion of bowel with slight discoloration. What concerns us more is the prevention and treatment. It has already been pointed out that errors of diet and management are the chief causes, and for this statement we have the carefully kept records of the Army, and of the great carrying companies, whose proportion of colic cases rise and fall with the prescribed ration, work, and stable conditions.

FLATULENT COLIC.

The symptoms are in the main the same, but with these distinctions; the attack is slower coming on; the flank is filled out, perhaps the belly is markedly swollen and drum like; the breathing is oppressed. If the expression of pain is not so acute, it is more lasting, and uninterrupted, than in spasmodic colic. Many minor symptoms might be mentioned, but the foregoing will enable the reader to recognise the flatulent form of the malady. Colic may first be of the spasmodic and later of the flatulent variety. Those persons having the care of animals with colic will assure the veterinary surgeon that the bowels are well open, and express their conviction that the trouble is "in his water." The explanation of this is to be found in the fact that most horses, when first pinched with pain in the bowels, void in one, two, or three little lots, the dung that was in the terminal portion of the canal. The excitement under which they labour at the time gives an expulsive effort and an amount of mucus with the evacuations, or with one of them, which easily leads the attendant to think the bowels are very free. Horses suffering from colic will posture as if to urinate, and not succeed in passing any water. The bladder has most likely a good deal of urine in it, but the neck of it is in spasm in sympathy with the bowel. When after many attempts, and perhaps after the groom has pushed some tobacco up the sheath, the horse does urinate, he immediately shows signs of relief, which he would have done if the tobacco had been up the man's coat sleeve instead. It is the relaxation of the spasm that enables the animal to pass water.

SAND COLIC, SANDED.

In some districts, notably on the east coast of England, a form of colic is met with unknown to others. The light sandy soil is taken in with the herbage, and accumulates in the intestines; as much as four gallons has been expelled by one horse. The most successful method of treatment is that of giving emulsions of paraffin. To an ounce of soft soap, a like quantity of water is added, and, after dissolving by heat, three ounces of paraffin is added with brisk agitation. A quarter pint of this mixture is diluted with three-quarters of a pint of water, and given as a dose on the first occasion, and on the two following days half the amount. In other respects, sand colic is treated like the spasmodic variety.

Treatment of Flatulent Colic.—The question is often asked if a horse with colic should be made to walk about, or allowed to seek relief by choosing his own attitudes, on the ground, or otherwise. The advocates of keeping a horse moving are under the impression that a rolling patient is more liable to get a twisted gut, than one compelled to keep on his legs. It is not possible to prove whether this is so or not. Men with the largest experience are of opinion that twist is caused by the spasm, and not by any attitude the animal may assume. If, on the other hand, rolling may cause a twist, it may also undo one, which a spasm has already brought about. I am under the impression that the latter has happened to horses upon which I have been in attendance, and am therefore an advocate of freedom to an animal in acute pain. He may find ease in certain contortions, as we do when we double ourselves up in a chair, or on a couch. A distinction to be made is between a horse blown out with flatulent colic and one suffering from the spasmodic form. Walking about will assist to break off the wind, both by eructations and from the rectum. A blown horse or bullock is not so disposed to lie down as the subject of spasmodic colic. In any case of colic, we should shake up a good bed, for the animal will get down during the paroxysms, whether we are advocates of moving him about or not, and we must avoid injuries to the sometimes reckless patient; pushing

in a handful of straw here, and a sack there, and never allowing him to be left until easy again. A gripe draught should be given without delay, and in this treatment probably all will agree. While wishing to avoid all dogmatism or pretensions to greater experience or knowledge than other practitioners, I would here say that I have seen the best results from the practice of first giving an aloetic ball, proportioned to the size, age, and breed of the animal (*see* Physic). In my early days, I am quite sure I lost cases through adhering too closely to academic teaching, and avoiding a purgative, which might result in inflammation—so said the teachers. The inflammation (in my subsequent experience) is from impaction and the want of the physic ball, which will be dissolving and getting to work while we are using our anti-spasmodics and anodynes. If the case is distinctly one of spasmodic colic, the draught may consist of three to six drachms of compound tincture of chloroform and morphia, two ounces of turpentine, and a pint of skim milk; or if a like quantity of any spirit is used, water will do in lieu of milk. Several useful formulæ for gripe draughts will be found elsewhere, but the improvident horse-owner who has no colic dose at hand may be reminded that any alcoholic stimulant is likely to be beneficial. In most farm houses will be found some turpentine, some brandy, whisky, or gin; perhaps some essence of ginger, cayenne pepper, a small bottle of chlorodyne, or of laudanum (purchased for the toothache), any or all of which may be utilised (*see* Table of Doses), but it is nothing short of criminal folly for a man who keeps horses to be without a gripe draught or the materials from which he knows how to concoct one. On the road, or in the hunting field, one should have no modesty in commandeering the flask of another horseman—he will not be worthy of the name if he grudge the whole of it for an animal with colic. For flatulent colic, the draught containing oil should be first given (*see* remarks on Hoven), and later, one containing ammonia, if the patient is not relieved. The physic ball is as appropriate in this form of colic as in spasmodic, perhaps more so, as the flatus may be the result of an accumulation (*see* Impaction).

Readers with experience of the sick lines in the Army will have found great good result from the chloral balls supplied They contain half an ounce of the drug, with ground seeds or cordials. Two such balls are commonly administered, as an ounce is quite a moderate dose, and two ounces may be safely given. If, however, the man is not an expert at giving balls, he had better give a solution, using a large quantity of water, not less than a pint for an ounce of chloral. If a ball gets crushed in the mouth it will blister the membranes, and for several days the animal will be slavering and incapacitated. This happened to a favourite charger when the balling was entrusted by the present writer to one whom he had reason to believe was quite a good man on the lines.

The rectum should be mechanically unloaded and clysters of soap and warm water thrown up. The belly may be kneaded with the knuckles, the limbs whisped with straw, a little gruel offered in the intervals of pain, and anything which is likely to add to the animal's comfort attended to. All noise and excitement should be avoided.

Veterinary surgeons now more frequently employ a fine trochar and canula and puncture the large bowel (colon) in the way recommended for puncture of the rumen in blown cattle, but this is too delicate an operation for the inexperienced. The hypodermic injection of morphia and other agents is also practised as being more rapid in effect than medicines administered by the mouth.

The hypodermic syringe and concentrated medicines were not given special consideration in the first edition of this book, as we did not anticipate a world

wide sale, such as has been accorded to it, and we would here refer our correspondents in the Colonies and foreign countries to Messrs. Arnold of Smithfield, and Huish of Red Lion Square, who supply strong instruments specially made for the thick skins of animals, and with reserve needles ; and to Messrs. Parke Davis, Burroughs & Welcome, and others who prepare tablets for veterinary use with much information as to doses and methods of employing them. Readers in tropical climates will find this form of medication most convenient : indeed the only form available. Eserine and pilocarpine, physostigmine and other remedies hypodermically injected, will save the life of many an animal where the Pharmacopœia tinctures, extracts, and bulkier compounds are unobtainable. As a matter of preference, based on long experience and experiment, the writer prefers the tinctures and infusions and decoctions, which, in this old country, can always be obtained.

RUPTURE OF THE BOWEL.

Either as a consequence of flatulent colic, of outward violence or structural degeneration, of nests of worms or lodgment of foreign bodies : occurs in horses : rarely in other animals. No treatment would be successful if a correct diagnosis could be made.

The symptoms are those of colic of an intense and unremitting kind, sweats or trembling and collapse, sighing, flapping nostrils, icy cold extremities, anxious countenance, swaying and falling down, probably to rise no more (*see also* Ruptured Stomach).

TWISTED GUT—STRANGULATED HERNIA.

Twisted, knotted, or otherwise entangled intestine, gives rise to pain not readily distinguishable from acute colic, save that there are fewer if any remissions of pain, until a fatal ending is approaching ; then mortification and insensibility to pain precedes the collapse of the vital powers. (*See also* Colic.)

Intussusception or involution of a part of the small intestine is a cause of acute colic, and although it may be supposed that this condition is sometimes spontaneously relieved and recovery takes place, it is commonly fatal. The condition of the bowel has been well described as similar to a glove when drawn off a moist finger and remaining partly inturned. There are no symptoms during life which will enable the attendant to distinguish between intussusception and twisted gut ; in both there is a running down pulse and collapse ending in death.

Pulse and temperature in the colics are not of much guide, so long as true colic is the only malady. With the onset of acute pain there will always be temporary increase of the number and decrease in the force of the pulsations, but these are not maintained. A nearly normal temperature distinguishes colic from inflammation of the bowels. If there is continued rise of temperature and persistent irritability of the pulse, we are led to fear complications such as those above referred to ; while what is known as a running down pulse presages a fatal termination.

RUPTURE OF THE RECTUM.

This accident was so rare as to merit only the attention of the veterinary profession, until an action was brought by a farmer against the owner of a stallion for " wrongful service " and consequent death of the mare by rupture of the rectum. It was held that the owner was responsible (through his servant) and he was cast in damages. Aneurisms and degenerations of struc-

ture, foaling difficulties, &c., have been known to cause rupture of this very strong portion of the gut, and in most instances with fatal consequences, as the contents escape into the abdominal cavity, causing peritonitis unless the injury is near the anus.

EVERSION OF THE RECTUM.

This occurs in parturition, in straining to evacuate hard fæces, in irritation resulting from diarrhœa and hæmorrhoids in horses and cattle, and among pigs, especially young ones, from unsuitable food. Cold weather predisposes sucking pigs to it and those whose diet is largely fluid. Dogs get eversion from bones and other hard bodies in the bowel.

The cause should be removed, the bowel should be cleansed with soap and water, and softened with oil and gently but firmly returned and secured in place by stitches having a wide hold, or better still with West's clamps, Fig. 39, which are now to be had of all instrument makers at little cost. In the case of little pigs and dogs which can be easily handled, they should be held up by the hind legs, as this position greatly facilitates the return of the gut. They should be fed on nutritious food in the smallest possible bulk for a week or so. A few grains of solid maize or other corn will keep the pigs together, while allowing the abdomen to sink in size and the previous pressure upon the bowel to cease. In the case of hogs it may be necessary to cut away a portion of extruded bowel, or draw a line round with a small brush dipped in strong carbolic acid to enable the part to slough off. A reduction may sometimes be effected by scraping off the discoloured membrane which is beyond repair if successfully returned. It sometimes happens after violent straining in parturition that so large a quantity of bowel comes out that its return is impossible, and the animal should be killed to save further suffering.

PILES OR HÆMORRHOIDS.

This is not a frequent trouble among farm animals, if we do not include the dog as such. In their case it is seldom true piles at first, but injury caused to the anus by rubbing the parts along the ground to try and relieve the intolerable itching of the part. This itching begins from imperfect action of the anal glands or little sacs whose office it is to secrete an unctuous material for the lubrication of the anus during the act of passing the naturally hard dung. The dog's dung should be hard, and there should be some little effort required, the pressure in a healthy animal causing the mouths of these little glands to open and pour forth just sufficient of the lubricant to enable the hard fæces to slip out after the first straining effort. It is therefore more often that we find these glands diseased in a dog fed on soft food than on hard, as the anal glands fill up and little abscesses form for want of use; the dog rubs his perineum on the ground; the abscess breaks; he goes on irritating the sore, and the end of the rectum becomes involved in the general inflammation. Piles, whether occurring in dogs or other animals, should be treated by careful cleaning with warm water and soap, and then astringents applied, as ointment of witch hazel, compound gall ointment, or solutions of alum if the anus itself is ragged (ulcerated) from rubbing. With removal of the cause the effect ceases, but we may here be permitted to remind farmers that the watch dog kept on chain cannot be wholly compensated by laxative food for the exercise he so generally needs. Give him a run when possible.

ENTERITIS—INFLAMMATION OF THE BOWELS.

Inflammation of a portion of the alimentary tube may follow on constriction or colic, or other of the bowel troubles previously alluded to, but enteritis

or muco-enteritis is not the same thing. It is a shockingly fatal malady; it arises without warning and the cause is unknown. Much speculative matter has been written as to possible causes, but we are still in ignorance and comparatively helpless in combating it when once recognised. In its early manifestation it is not easily distinguishable from colic. The horse becomes uneasy, looks round at his side, scrapes the ground, bends his knees and perhaps goes down, remaining prone for a few minutes, but finding no relief gets up again, scrapes, looks round, wears an anxious expression, and passes through all the usual stages of colic, except for any interval of freedom from pain. We are presently able to differentiate between enteritis and colic by the persistence of the pain, the injection or high colour of the visible membranes, the elevated temperature, small thready pulse which scarcely varies at all, and the countenance, which wears a look of mortal illness as distinguished from one of temporary though acute pain. There are cases in which the pain is so acute as to render the patient as violent as in colic, but, as a general rule, it may be supposed from the patient's behaviour that the pain is not so intense. The sufferer will often scrape feebly, monotonously, hopelessly, but with an absence of passionate resentment such as actuates the horse with spasmodic colic, who lashes his tail and strikes his belly with hind feet, throws himself on the ground violently, and even bangs his head against objects in the stable. The sufferer from enteritis goes down gently and groans as he reaches the ground, remains there more or less quietly, until he seeks relief by rising again. He will seldom eat anything from the first; the colicky horse will feed between the paroxysms. While the great majority of cases of true colic terminate in recovery, it is unfortunately true that the very reverse is the case in inflammation of the bowels.

Owners and horsemen in attendance are very frequently deceived into thinking a great change for the better has taken place when a period arrives at which pain ceases and the animal stands quietly doing nothing. The vet. knows what to think if the messenger says that the patient is better but *has not eaten anything*. He finds on arrival that the pulse is almost imperceptible, the respirations shallow, the extremities cold, and unconsciousness is approaching. Nothing can then be done.

Treatment.—Drastic purgatives as aloes are forbidden in this disease, and control of the pain is the chief aim of the veterinary surgeon.

Half an ounce of calomel with as much as one ounce of opium may be first given, and two drachm doses of opium or choral at intervals of four or six hours. It may be explained that calomel in these circumstances is not a purgative, but a bowel antiseptic, according to the most advanced pathologists, who did not however discover its utility in this connection.

The constipation may be disregarded, as the bowels will act again when the inflammation has subsided.

A hot pack around the belly containing some aqueous extract of opium or belladonna is calculated to ease pain and assist the internal remedies to obtain sleep for the patient. If the subject is a full-blooded one, two or three quarts of blood may be taken from the jugular vein in the early part of the illness. The extremities should be kept warm by hand rubbing and bandaging, the body lightly clothed, the box well ventilated, and beyond the necessary watchfulness in preventing the animal from getting into a bad position, or one from which he cannot rise, he should be left alone in order that he may have every inducement to sleep, a need too often forgotten, yet of the utmost importance in any serious illness.

Convalescents are often killed by the impatience of those in attendance. They are anxious to see a passage through the animal, and as days go by without any fæces, are tempted to give an aperient just at a time when in-

formation is so readily set up again. A laxative diet, as linseed gruel, cake, mashes, small quantities of linseed or cod liver oil if the animal will take it in his food, should be employed to soften the contents of the alimentary canal while waiting for nature to make the required effort in a structure restored to its normal functions, one of which is to contract upon its contents and move them slowly on. Much care is needed in nursing back to vigour the subject of this very fatal disease, and a considerable time should elapse before he is asked to do any work.

DIARRHŒA, PURGING, SUPERPURGATION.

The frequent passage of liquid dung is commonly called diarrhœa, and is to be distinguished from purging intentionally induced, or from superpurgation, although the latter is an artificial diarrhœa. Diarrhœa must not in all cases be assumed to be a disease; it is often a refusal on the part of the intestines to tolerate something which would be injurious if remaining. It may also be supposed that it is an effort of nature to throw off disease, as sneezing relieves catarrh, vomiting does the stomach, and thick urine the kidneys. Sudden changes of diet, or any unsuitable food may cause diarrhœa, and, unless the symptoms are urgent, we should seek rather to remove the cause than to administer astringent medicines. Fluid evacuations may be a symptom of some constitutional malady, as tuberculosis, or the scour of calves (*see* Scour, below).

Treatment.—Horses and cattle may have opium and catechu, chalk and bismuth, infusion of oak bark (*see* Table of Doses), and the white of eggs in milk, arrowroot, rice, and the water in which it is cooked, flour, gruel, and dry sound hay, while roots, bran, linseed, and all other laxative foods should be withheld. With calves, pigs, lambs, and dogs, it will nearly always be right to give a preliminary dose of castor or linseed oil, or both. There is some acrid or fermented substance to be got rid of before any other treatment is likely to succeed. The same astringents as advised above may be prescribed for these animals in proportionate doses (*see* Table of Doses).

Superpurgation is the result of over-dosing with aperients, and to be treated as diarrhœa, *plus* the administration of stimulants to sustain the animal and prevent collapse (*see also* Physicking).

SCOUR, SCOURING, SKIT, WHITE SKIT, ETC.

Animals at all ages are subject to diarrhœa, but the scourge of the breeder is scouring among calves. Lambs and pigs are not exempt, but the chief source of loss is among calves. It should be clearly understood that there are many causes of this malady, some of them due to errors of diet and management, and the hardships to which young animals are exposed, as conveyance to markets and fairs, long abstinence, fright, overexertion, and improper food. The dairy farmer wants to sell milk and raise calves without it. The analytical chemist tries to help in this unnatural business by providing substitutes. The conspiracy is more or less successful—less, when it sets up scouring, which either cannot be cured or leaves a poor lade bound stunted calf whose owner hopes to restore with summer grass. No practical farmer can question this statement, but the novice may easily convince himself by inspecting a herd where raising calves is more important than selling dairy products. The separated or skim milk is too often given at long intervals and cold, while nature's plan is to give it frequently and warm; and yet men express surprise that nature should resent such gross disregard of her laws. Newly born calves are put on stale milkers, already supporting one or two other calves, if allowed to suck at all, and expected to do with milk not suited to them. The first milk of a cow just calved contains colostrum or

"beastlings," which gives the yellow colour to it and acts as an aperient to the calf allowed to take it. It clears from his intestines the accumulations of uterine life, and gives him a fair start. The milk differs in proportion as time goes on, but is best suited to the growth and development of the calf, as seen in those show animals which have run with their mothers as long as they like. The dairy farmer cannot afford to do this and must make the best use of substitutes he can. The question then is, what substitutes to use?—for without a balanced ration he may expect scours or other forms of indigestion, and no profit from calf-rearing. The absence of milk fat is the chief cause of scouring in calves reared on separated or skim milk, or blown out with much diluted milk. The recommendations of the Board of Agriculture in this matter may be quoted at length, and one could wish that every farmer would avail himself of the free leaflets issued on this and other subjects by the Board. Anyone may have them free of cost, by posting an unstamped request to the Secretary, 3, St. James's Square, London, S.W. "The Department have found that a small quantity of pure cod liver oil serves as a useful substitute for cream. It may be fed in quantities from a half-ounce to one ounce twice a day. To feed it, it is best poured among the warm milk and stirred up; most calves will then drink it. Small quantities of a mucilage prepared by steeping flax seed (linseed) in hot water will, perhaps, be found quite as good as cod liver oil. Mixed milk, composed of one part whole and five parts separated, will also give good results, if supplemented by linseed cake, fed dry—provided this diet is not given too early in the life of the animal. To starve young calves by feeding on separated milk is altogether inexcusable. The price of the few gallons of milk which is saved is a poor return for the loss in the diminished value of the animal, and especially when, for want of its natural food, the animal, weakened by an attack of disease, dies."

These are the points one would wish to emphasise when correspondents write for a "cure" for scours, or a specific which shall compensate wronged nature.

Scours arising from digestive or dietary troubles may be treated, first, by a fairly bold dose of castor oil, from one to three ounces, or one part castor oil and three of linseed oil. The object of this is to clear out fermented ingesta and break up curdles with which the stomach has been unable to deal. After this action the purging may cease, or if it continue a choice of astringent agents is left us, with some of which we shall most likely succeed if the food is suitable and management rational. The following are good mixtures to keep in stock and give after the oil:—

Youatt's Cordial.

Prepared chalk	2 ounces.
Catechu	1 ounce.
Ginger	½ ,,
Opium	1 drachm.
Peppermint water	1 pint.

Dose, two to four tablespoonfuls.

White's Cordial.

Ground caraway	½ ounce.
Ginger	½ drachm.
Bicarbonate of soda	1 ,,
Brandy or gin	1 ounce.
Water	8 ounces.

Mix. For one dose.

Leeney's Mixture.

Compound tincture of morphia and chloroform -	- 4 drachms.
Liquid bismuth - - - - - - - -	- 4 „
Oil of cloves - - - - - - - -	- 1 drachm.
Cooled linseed tea - - - - - - -	- 7 ounces.

Mix. A dessertspoonful to a tablespoonful every eight hours until better.

A simple remedy for troubles of this sort is recommended by the United States Bureau of Animal Industry. This is formalin. A report of an experiment in this direction states that Dr. Klein treated twelve calves affected with scour by adding formalin to the milk in the proportion of one part of formalin to 4,000 parts of milk. The easiest way to do this is to pour half an ounce of formalin into 15½ ounces of water. Then take one teaspoonful of this solution to each pint or pound of milk which is fed the calf. Of the twelve calves treated in this way eleven recovered without any further treatment, seven of them recovering on the second day, three on the third day, and one on the ninth day.

Leaflet No. 272, issued by the Ministry of Agriculture, should be in the hands of every calf owner.

INFECTIOUS SKIT, SCOUR, OR WHITE SKIT.

In the previous pages we have considered scour as it may occur anywhere, independent of infectious agencies. The much more serious disease now claiming our attention has proved so ruinous in Ireland and certain districts of Britain that the Government invited Professor Nocard to investigate it in the chief centres of the dairy industry in the sister island, and then published that eminent veterinarian's report, a digest of which can be had free of cost or postage on application to the Secretary of the Ministry of Agriculture (Pamphlet No. 11).

The disease is due, according to Nocard, to a specific organism which gains entrance into the body by way of the unsealed navel string. The germs are spread over the walls, flooring, and utensils wherever calves have suffered from the malady. It is therefore deemed imperative to treat the navel string to protect the individual, and to thoroughly disinfect the premises and utensils in order to stamp out the disease. For these purposes the following recommendations are made, after prolonged experiment in the districts chiefly affected, and with excellent results.

PREVENTION OF WHITE SCOUR AND JOINT ILL.

The following procedure should be fully and carefully attended to :—

I.—Disinfection of Premises.

"The floors of cow-houses and calf-houses should be thoroughly cleaned and disinfected at least once a week with a solution of blue-stone (2 lbs. blue-stone to every 3 gallons of water required). The floor of the calf-house should be concrete, and must be swept daily and disinfected with a solution of blue-stone of the above strength.

II.—Navel Treatment.

(*a*) When the cow is about to calve, place a good layer of clean fresh hay or straw behind her to keep the calf clean.

(*b*) When she shows signs of calving, her 'bearings' should be washed with a warm 2 per cent. solution of lysol in rainwater. The same warm solution of lysol should be injected into the passage through which the calf is to be born.

(*c*) The navel cord should be tied immediately at the birth of the calf with twine which must be kept ready in a solution of lysol. The person who is to tie the cord should first scrub and wash his hands in a solution of lysol.

(*d*) Immediately the cord is tied, the portion adhering to the calf and the surrounding area must be well painted with a solution of iodine in methylated spirits (35 grains iodine to 2 pints methylated spirits).

(*e*) After a few minutes the navel cord must be painted with a layer of collodion containing 1 per cent. of iodine, or Stockholm tar may be used for this purpose instead of collodion and iodine.

The writer of this book has found collodion, with one in eight of carbolic acid or salicylic acid, answer well, and the most economical method of using, that of dipping the umbilical cord in a wide-mouthed bottle, which must be promptly corked to save rapid evaporation. Stoppered bottles are more liable to stick than corks, and the latter are to be preferred. If only a brush be used to paint the cord, pure carbolic may be employed, as it quickly withers the 'string,' but it must be carefully applied so as to avoid injury to the tender belly skin, which it will burn. Neither in glycerine nor in oil should the acid be used in this case, although often recommended for wounds and other injuries. The object here is to prevent germs entering, both by the presence of an antiseptic through which they cannot pass, and by the drying off of the cord, which is Nature's own plan (sometimes too tardy) thus shutting the gate.

III.—General.

Navel treatment without repeated and absolute disinfection will not be successful.

Newly born calves must be placed in a spot which has been freshly disinfected. Carbolised sawdust will be found a useful litter.

Healthy calves should not be housed or fed with those that are diseased.

Do not feed separated milk till the calf is four weeks old. The change from new to separated milk should be gradual. Give the calf a substitute for the cream removed by the separator. One to two ounces per day of the best cod-liver oil, or a mucilage prepared by steeping flax seed or good linseed cake in hot water, will be found useful for this purpose, if the quantity is carefully regulated in accordance with the state of the bowels.

The main point in prevention is disinfection of the premises.

Half-measures will not be effective.

Medicinal treatment is the same as that recommended for other forms of scouring; the mixture containing oil of cloves being specially recommended for its germinal as well as astringent properties."

DYSENTERY.

Diarrhœa, superpurgation, and scours have been referred to, and are to be distinguished from dysentery or chronic diarrhœa with a disposition to bloody discharges and the formation of ulcerated patches of intestine. There are acute and chronic cases of dysentery, the former sometimes following upon diarrhœa and superpurgation, and the latter more frequently arising from constitutional disorders, as tuberculosis. All animals are liable, but the horse least so; cattle and dogs being pre-eminently disposed to dysentery, the former in connection with the tubercular disease of the bowels, sometimes called consumption of the bowels, and to Johne's disease, and dogs as a sequel to distemper. Poisonous plants in certain pastures and putrid water may also give rise to it, and when noted in woody districts and shaded waters uninfluenced by the sun it is called "wood evil" and "moor evil."

The special organism which gives rise to it in such situations has not been determined with certainty, but it has long since been demonstrated that disease germs flourish in the dark and in shady places, which maintain but a precarious existence in open daylight and sunshine. The water of the river Danube was tested every hour of the day and night, and it was shown that the proportion of living germs in the dark hours was very much more numerous than in the day, there being the largest number in the middle hours of the night, and the minimum in the middle of the day, when the sun has most power. Our grandmothers knew the importance of sunshine and air, and said it was "wholesome"; we of this generation have merely confirmed it, and endorsed their views by scientific proof. Stagnant water on which the sun never shines may be employed for drinking purposes for a long time without injury, because not impregnated by disease germs, but once those germs have access they find a suitable breeding place, propagate rapidly, and spread disease. The open pond in the farm yard in which manurial matters flow will often be preferred by stock to drink from, and does them no harm perhaps for a whole generation, but once let it become infected with disease germs and disaster follows, the occupier generally refusing absolutely to believe that the pond water is the cause, on account of the good character it has always borne, and the preference the animals have shown for it when clean fresh water was to be had.

Symptoms.—These are similar to diarrhœa, but for the persistence and passage of blood and mucus. The discharges are frequent, and the animal wastes very rapidly in the acute form, and continuously in the chronic. The malady is well known in cattle, and in many counties they are called "wasters," or "wastrels," or "piners and skinters."

A foul tongue or clammy mouth, arched back, tenderness over the loin region, and offensive breath attend this disease, especially when due to mercurial poisoning (salivation).

Air bubbles in the dung when passed are accounted for by the gases contained in the bowel and normally absorbed in the faecal matter when the animal is in health. It is a rough test, but not a very valuable one. If one saw it in a thin animal at a fair, it might be enough to make a buyer decline to purchase if he had other doubts as to soundness.

Treatment.—Firstly a mild aperient of oil, after which any of the remedies advised for diarrhœa and superpurgation may be tried, and in addition tonics of the astringent type, such as powdered oak bark, witch hazel, sulphate of copper, iron, and, if much bad odour in the dejections, small doses of hyposulphite of soda (*see* Table of Doses).

When dysentery arises from tuberculosis it will be a saving of time and trouble at once to slaughter the animal.

Dogs will afford reasonable hopes of success if persevered with and made to drink rice water and eat the cooked rice, together with whites of eggs and arrowroot and other astringent foods, avoiding meat until the symptoms have passed away, and beginning with boiled fish, white meats, as rabbit and fowl, and gradually returning to their former diet.

Johne's disease.

Johne's Disease was not known in this country until the last two or three years. It is a wasting disease like tuberculosis, and has frequently been mistaken for it. It often exists with the latter. By itself no reaction is given to tuberculin. Animals suspected of tuberculosis and not responding to the test have wasted away and been killed as tubercled, and discredit has been thrown upon the tuberculin test because it failed to detect what is commonly called a rotten subject, a waster, or a skinter.

It is only by post-mortem examination that proof can be obtained. Sir John Macfadyean says: "A remarkable feature of this disease is the trivial character of the lesions, even when the number of bacilli present is enormous."

The symptoms are easily confounded with those of other causes of inflammation and diarrhœa, and there is no one in particular during life which can be said to be diagnostic. This is unfortunate, but by a process of elimination we may often make a pretty good guess, and the doubt itself may indicate the wisdom of slaughtering some wasted individual of next to no value, and so enable us to detect the malady, and take suitable measures for the protection of the herd. First, our efforts at diagnosis will be directed to the tuberculin test. The failure to get a reaction is one negative proof. Next we examine the excreta daily for minute worms, such as cause the Lincolnshire lamb disease, and the scouring known as strongylosis in other ruminants. The absence of these is another negative symptom pointing to the possibility of Johne's disease. The general history of the case must be considered in connection with all other losses occurring on the holding, and with particular regard to the field or place where they happened. If similar wasting and diarrhœa has been observed, and no tubercles found after death, the presumptive evidence is considerable.

As to treatment, experiments conducted at the Royal Veterinary College go to prove the utility of rather large doses of sulphate of iron and dilute sulphuric acid (100 grains, and half an ounce) daily, in checking the progress of the malady and getting a beast half fat for the butcher. As long as improvement continues the medicine may be given, but as soon as the animal is again attacked, he should be set aside for slaughter.

As the gut, and a portion only of that, is affected, there is no objection to the use of the flesh for human food, beyond the unfinished state of the beast at the time of slaughter.

The enquirer who has not the services of a veterinary surgeon to make post mortem examinations, will look for a thickening of the bowel only, not for sores or ulcerated portions. These grosser lesions are easily seen, but the microscope will decide with certainty. The folded or puckered portions of bowel will not stretch when pulled in opposite directions if the thickening is due to Johne's disease, whereas they do so when contracted from other causes. This may be regarded as diagnostic, by those who cannot undertake microscopic examinations.

To what extent and for how long pastures remain infectious after subjects of the disease have been grazed upon them is uncertain.

PERITONITIS, OR INFLAMMATION OF THE BELLY.

The serous membrane which lines the abdomen and invests the various organs contained in it is liable to inflammation, which may be general and diffused or confined to some particular portion. It is commonly caused by an injury or invasion from another structure already inflamed, as a sequel to castration or spaying, and the many abdominal injuries resulting from outward violence in falls, and by kicks.

Symptoms.—These differ considerably from the signs observable in enteritis, in which the lining of the bowels is affected, and which resembles colic in all but the periods of remission of pain (*see* Enteritis and Colic). In peritonitis the animal is deeply depressed; it may be that he suffers as great pain, but he does not show it in stamping and scraping. He stands, as it were, riveted to the ground, afraid to move on account of the pain anticipated.

The belly of an animal suffering from general peritonitis is at first drawn up from the floor and pushed out at the sides, but afterwards falls and is found to contain a dropsical fluid which may be heard on pressing the ear to the flank

low down. A few days usually settle the question of life or death, unless a slight abatement follows and a chronic condition ensues. If this happens the apparent recovery often proves a greater loss than death during the acute stage, as the bowels become enmeshed in a fibrous exudate and gradually compressed, until their functions are so interfered with that the patient eventually succumbs. A few cases recover on summer pasture, but seldom thrive well. If only a small portion of the peritoneum be involved, as may be the case when the inflammation has spread from the divided spermatic cord after castration, no serious sequelæ may be expected.

The breathing is rapid but shallow, the pulse quick, hard, and wanting in volume, the extremities soon grow cold, and a short period of delirium may precede death, or coma and paralysis indicate the end.

Treatment.—This should be energetic. A hot pack should surround the belly, and care taken when renewals are made not to allow evaporation and chill (the chief objection to the hot water treatment for any abdominal trouble). The rug or sheet intended to replace that already upon the patient should be prepared before removing the old one. Bold doses of opium or Indian hemp may be given (*see* Table of Doses), as it is very much of "a kill or cure" undertaking, and if the time can be tided over when the animal would otherwise sink and die, he may recover. Constipation need not be feared; the great thing to attempt is to arrest movement inside by controlling the ordinary peristaltic movement of the bowels. This is best accomplished by opium or choral, but Indian hemp is the greater anodyne, and both may be given together or alternately. If recovery takes place, much care in dieting is necessary, only light and digestible food being allowed for some length of time.

Dropsy of the belly sometimes follows, and permanent adhesions of the intestine to the sides; this is not, however, the common cause of abdominal ascites (*see* Dropsy or Ascites).

DISEASES OF THE LIVER.

Apart from the infestation of the liver with parasites (*see* Liver Rot), and the deposit of tuberculous or other tumours, this organ may be said to be comparatively immune from disease—at least in comparison with the human subject.

Horses, dogs, and fowls, by reason of their more artificial lives, suffer more from liver disorders than those animals whose lives are largely spent under natural conditions.

Congestion, or excessive amount of blood in the organ, failure to prepare biliary products in proper quantity and quality, fatty accumulation or degeneration, and a chronic inflammation which results in loss of function, are the chief forms of liver complaint from which horses and dogs suffer.

The stabled horse, habitually overfed and underworked, and the pet dog suffer alike from inactive or congested liver, and may have what is known as cirrhosis, which is a condition in which the fibrous tissue between the hepatic cells increases in volume until it squeezes out of existence the true liver substance (hepatic or liver cells).

Symptoms.—Dullness and loss of appetite, constipation, bad-smelling faeces, absence of bile in them, yellowness of the eyes (conjunctival membranes), occasional colicky pains and looking round at the flank, high-coloured urine, morbid appetite, grinding the teeth, increased temperature; in horses sometimes there is lameness of the right fore limb; in dogs much sleepiness and a disposition to become morose. The latter suffer from liver congestion largely from the habit of lying in front of a fire, which should be discouraged by every true lover of dogs.

Treatment.—A return to healthful conditions of life will often restore the overfed carriage horse, and in almost all cases a run at grass will be beneficial. Town horses are sold at auction on account of liver troubles, and passing into the hands of farmers, and leading useful lives under fair conditions, regain their health without the purchasers ever discovering the true reason for which they were sold. Calomel, and other preparations of mercury, stimulate the liver to action in horses, cattle, pigs, and dogs. Aloes, both in aperient doses (*see* Physic) and in small quantities repeated at short intervals, have a beneficial influence on torpid livers, and for dogs, blue pill in one to five-grain doses is excellent, but must not be too often repeated, as these animals are particularly liable to salivation.

If we except dogs, it may be said that saline medicines act best on animals. Repeated small doses of Epsom salts, of sulphate of soda (Glauber's salt), and of bicarbonate of potash are recommended; their action is slow, but if given in small regular doses appear to draw away congestion and establish a better action (*see* Table of Doses).

RUPTURE OF THE LIVER.

Old horses whose livers have undergone degenerative processes, owing to chronic congestion, are not infrequently ruptured, and death ensues from hæmorrhage into the abdominal cavity, or into the covering of the organ which grows tough with chronic disease (perihepatitis). From examination of many dead subjects it appears that small ruptures may occur and repair take place, but where there is any very extensive rent there are the usual signs of internal hæmorrhage, as pallor of the membranes, sighing, swaying, cold extremities, perhaps partial sweats, and more or less swelling up of the abdomen. (*See* Ruptured Stomach and Bowel.)

JAUNDICE—THE YELLOWS.

Jaundice is a symptom rather than a disease in itself, and there are several conditions which give rise to it. Any obstruction in the circulation of the liver may cause it. The yellow colour of the membranes and skin is due to the colouring matter of bile getting into the general circulation of the blood. Although frequently due to degeneration of the liver, or active disease, it may occur in an animal whose liver is quite sound and well, as has been demonstrated by tying a ligature round the common duct through which should pass the biliary secretion into the intestine. There are a number of pathological conditions which may cause the bile to be diverted into the blood; there may be suppression, or non-elimination, or reabsorption.

A frequent cause of jaundice is catarrh of the stomach, extending to the small intestine. The orifice of the hepatic duct in the first portion of the gut (duodenum) is blocked by the tumefied membrane, and this prevents the bile from flowing into the proper channel; as in the experiment of ligaturing already mentioned.

Symptoms.—The one constant symptom is the staining of the visible membranes of all animals. Dogs also show the yellow staining in the pads of the feet, when it exists in an acute form. Loss of appetite, nausea; manifested in horses by curling the upper lip and extending the head in an upward direction; dribbling or slavering in cattle or sheep, In the latter it is often associated with liver-rot or flukes which block up the ducts and prevent the flow of bile. The staining is seen also in the urine, and by testing it with sugar and sulphuric acid it can be determined whether or not jaundice is due to obstructed bile ducts. For us, the tests have but little value, since the treatment is not materially altered, and we are more or less confined to simple and direct remedies.

Treatment.—Unless we have good reason to suppose that the trouble is due to tubercular deposits, tumours of other kinds, or to advanced fluke disease, in which any treatment will be equally ineffectual, we may at once attempt to act on the liver with calomel and aloes, in horses, cattle, sheep, and swine, and in the case of dogs with blue-pill alone. A drachm of calomel, with three to six or more drachms of Barbadoes aloes, may be given to horses and cattle, and a proportionate dose to sheep and swine (*see* Table of Doses, also Physic). The drastic aperient should be followed up with salines, as recommended at page 70 for congestion of the liver, and if improvement is effected a final course of nitro-hydrochloric acid and gentian (*see* Table of Doses).

GALL STONES.

These are occasionally met with in animals, and may give rise to colicky pains during life, but there is no reliable means of diagnosis.

DISEASES OF THE KIDNEYS.

Animals do not suffer from so many disorders of the kidneys as human beings, as they are abstainers from alcohol, and, so far as we know, untroubled by many of the passions which act injuriously upon our circulation, and therefore upon the kidneys. They are a little more liable to parasitic diseases, but such worms as the Strongylus gigas are rarely found in temperate climates.

The chief office of the kidneys is to separate from the blood circulating within their substance the worn-out materials of the body. In the normal state, these substances are held lightly in solution, and give an amber colour to the urine. In herbivorous animals the urine is alkaline; in carnivorous, acid. Urea is the solid substance, besides certain salts and imperfectly defined organic matters. The white crown on fowl's dung is solid urea.

The proportion of water and the colour of urine varies a good deal, according to the amount of water taken into the system and the waste going on in the tissues, also upon the feeding and state of digestion. A horse at work will show a higher colour in his water than one doing nothing on a grass diet. An overfed animal doing nothing may show a high colour, as the kidneys endeavour to carry off excess and act for the skin vicariously. The intimate relation between the skin and kidneys is often demonstrated in illness. Uriniferous sweats are noted when inflammation of a kidney interrupts its function of separating urea from the blood. On the other hand, when the skin is checked, the kidneys take upon themselves additional work; a fact everyone must have noticed in very cold weather.

A great deal of misconception exists, especially among stablemen, with regard to the kidneys, and diuretic medicines are much abused. Thick urine, as when horses have stood in the stable while highly fed, or when in the spring time green meat is first partaken of, is not an indication of anything amiss with the kidneys; they are the filters of the body; they do not even *make* the urea or the salts; they separate it from the blood: the whole volume of blood the animal contains must necessarily pass through the kidneys, as it does through the liver, and the brain, the salivary glands, or the testicles. Each of these organs or glands has a power of selection: each selects from the circulating medium particular substances. The liver chooses various matters, the salivary glands certain salts and ferments, the testes elaborate semen, and the kidneys separate urea, which is the most important product of tissue change. Its chemical composition is the same as carbonate of ammonia, into which it is readily converted by heating to a little over boiling point. The student of agricultural chemistry will value the ammoniacal compounds as manures, from their resemblance to this highly fructifying

natural manure, which he will be careful in practice to secure, instead of allowing it to run away into drains, to spoil fresh-water streams. The amount of urea excreted or eliminated by the kidneys bears a relation to the fluid taken into the body. When cattle and sheep are fed largely on turnips and linseed cake, there is an abundance of phosphates in the urine, which, falling out of solution, may be deposited on the membranes of the canal or the hairy appendages surrounding the outlet. These deposits are a frequent source of trouble, forming sabulous accumulations and setting up irritation, which interferes with the free passage of urine as well as hindering copulation. Pus, blood, mucus, and small gritty particles are occasionally found in the urine, and may come from the bladder or any part of the urinary apparatus.

INFLAMMATION OF THE KIDNEYS, NEPHRITIS.

Most cases of inflammation of the kidney are caused by external violence, or by exposure to continuous cold rain, or else by the injudicious use of so-called diuretic medicines.

In sympathy with strains of the loins, particularly those muscles under the spine, inflammation may extend to the kidney. Turpentine given in excess, nitre, resin, oil of juniper, and other popular remedies for "thick water," are perhaps a more frequent cause of inflammation of the kidneys than all the others combined. Occasionally we meet with it as the result of absorption of blisters: notably those composed of cantharides and turpentine, and when the cure of impotence has been attempted by giving Spanish fly internally in too large doses.

Symptoms.—Those first noticed as a rule are difficulty of urination; the frequent posturing, as if to urinate, but without result; or the passing only of a very small quantity of high-coloured fluid, which appears to scald the membrane and provoke a groan from the patient. An arched back and straddling gait is by no means an invariable symptom, but may indicate a sprained loin and several other conditions. Pains as of colic, together with a high temperature, a hard, frequent pulse, thirst, rapid shallow breathing; these are the prominent symptoms. Arching of the back and immobility are more prominent in cattle, pigs and dogs, than in horses.

Treatment.—This disease is perhaps one of the few for which the modern veterinarian will advocate bleeding. "If the pulse be strong, a full bleeding will be of much service, not only allaying the febrile disturbance, but acting as an evacuant, removing much effete material from the economy." So says Professor Williams, with a unique experience of such cases. A good aperient should be early prescribed. A physic ball for the horse (*see* Physic), salts for cattle and sheep, calomel and jalap for dogs. A large warm poultice should be applied to the loins, and frequently renewed. A pillow-case filled with scalded spent hops will do, or bran and linseed, boiled turnips or other roots, bread, &c., any substance that will retain the heat for a considerable time. It may be made more soothing by the admixture of extract of belladonna, rubbed down with warm water, and distributed throughout the poultice. Digitalis is also recommended for this purpose, but must be used with caution. No liniments containing turpentine, as white oils, should be employed, or the case may be aggravated by absorption. Demulcent drinks, as linseed and hay tea, or barley water (*see* Foods for the Sick), should be given, but on no account medicines which ordinarily act upon the kidneys as stimulants. Recovery takes place in most instances, and the skin often comes to the rescue by affording uriniferous sweats. These are generally followed by a rally. If restoration of function or compensation through the skin and the remaining sound kidney does not soon take place, a state of uræmia or uremic poisoning follows; the effete materials of the

blood failing to be removed, accumulate in the system, and act upon the nerve centres as a powerful poison, causing paralysis and death. When one kidney only has suffered from inflammation, it may subsequently degenerate or waste away, but this is commonly compensated by the enlargement of the other, and with an increased capacity for work.

ALBUMINURIA.

Albumen in the urine is not rare in health, and the disease known as Bright's disease in human beings is so rare in animals as to scarcely call for notice in a work of this sort.

STONES IN THE KIDNEY, RENAL CALCULI.

The appearence of blood in the urine must not be confounded with red water. When it is met with, it is not properly mixed with urine but has the appearance of clots or streaks of blood, and these are likely to be caused by the presence of a kidney stone or calculus, which has injured the tissues in which it is confined. The shifting of these hard bodies gives rise to pain and perhaps nephritis, and they may descend into the uriniferous tubes and block the passage of the water. When the latter happens, the animal suffers intense pain; matter forms; the kidney rapidly degenerates, and death soon follows.

Treatment.—If stone in the kidney is suspected or blood comes from it, soothing remedies as prescribed for inflammation of the kidneys may be adopted. On no account give diuretics.

INFLAMMATION OF THE BLADDER, CYSTITIS.

The causes of inflammation of the bladder are much the same as those giving rise to inflammation of the kidney, which see.

Symptoms.— Excitement followed by great depression. Distressed countenance, urine passed in small quantities and often, and with evident pain. The dung is dry, or covered with mucus, or perhaps blood, if the cause was absorption of a blister, or over-dosing with cantharides, or diuretic medicines.

Treatment.—Anodynes as advised for kidney inflammation, and poulticing of the loins, and the demulcent drinks. Bicarbonate of potash or soda in the drinking water, with a view to neutralise the scalding of the water.

RETENTION OF URINE.

The urine is sometimes retained, and for various reasons. It has been noticed in colic, as due to spasm of the neck of the bladder—and on relaxation of the spasm the water comes away and the patient gets relief from pain (*see* Colic) -or to the descent of a stone into the canal of the penis; enlargement of the prostate glands in males, milk fever in females (cows), stones in the bladder or in the canal (urethra), displacement of womb or vagina, accumulations of hard dung in the rectum, pressing upon the canal, accumulations of sticky material in the sheath of geldings (cod wax*), and in some cases from inability of the animal to place himself in the suitable posture.

Symptoms.—Frequent efforts to pass water without success, or the escape of such small quantities that the attendant supposes the animal to be unable to hold it (incontinence); straining, groaning, straddling, and general uneasiness.

Treatment.—It is important to give immediate attention to an animal unable to urinate, or the most serious consequences may follow. The rectum should be emptied with a greased hand if the animal is large enough to permit of such an operation, or washed out with clysters of soap and water, if not, and the parts explored. If the bladder is full, it will be felt as a large round

* Clearing out the sheath with melted lard and soap and water will often succeed in such cases.

substance, and perhaps, with gentle pressure from within, some urine may be passed, the obstruction being only a little greater than the animal's expulsive powers. The bladder must be unloaded, and the proper instrument is a catheter. The veterinary surgeon is the person to whom such performances should be entrusted. If one is not available, the male animal may perhaps be successfully operated upon by a horseman who can draw out the yard, and having dressed the instrument with an antiseptic, and oiled or greased the end, pass it slowly and without jerking until it reaches the curve round the brim of the pelvis, where assistance should be given by another person pressing lightly upon the perineum, where he will feel the coming catheter and see the slight bulge, if he hold up the tail properly. When this point is passed the rest of the way is easy, unless some calculus or other body arrests the instrument. It is made to proceed with caution until it reaches the bladder. The stilette is then withdrawn, and the urine runs away in a steady stream, until the greater part of the contents of the bladder have been taken. It should then be removed, and the patient allowed to lie down and rest if he will. Passing the catheter with mares presupposes a knowledge of anatomy which but few amateurs are likely to possess; but in a desperate case one might pass his hand along the floor of the vagina and feel for a fold of membrane under which the opening is placed. If he can get the shorter instrument made for mares, and pass the end into the bladder, there will be no difficulty in getting a flow of urine. The same thing applies to cows. Bulls are so formed that the catheter cannot be passed. It used at one time to be supposed that a dog could not be relieved of a bladder full of water, because there is a bone in the penis; but there is a channel all the way through it, and a fine instrument is needed, such as might be employed for a young infant. They are to be obtained at every drug store.

INCONTINENCE OF URINE.

This is of course the reverse condition to that considered above.

Causes.—Paralysis of the sphincter of the bladder, atrophy of the muscular walls of it, stones in the passage, or from imperfect sealing of the navel (*see* Pervious Urachus).

Bitches of a shy or nervous temperament and young dogs are prone to a form of incontinence which can only be attributed to nervousness, and from which they generally recover when the character is formed—or retain the defect for life if they never grow bold and confident. The latter more especially applies to bitches. Dogs of both sexes, when taught to retain urine until certain convenient hours for going out, will suffer the most dreadful degree of distension of the bladder rather than commit an offence, and these are liable to strangury or paralysis.

DIABETES, POLYURIA, PROFUSE STALING.

True diabetes, in which sugar is passed in the urine, is very rare among animals, but polyuria or profuse staling, which goes under the name of diabetes, is quite common, as the result of dietetic errors. The horse is perhaps more subject to it than other animals, but irregularities in him are more likely to attract attention.

Damaged foods, as mowburnt or musty hay, and oats artificially dried, are fruitful sources of the malady, but it is observed to follow on influenza and other debilitating diseases. Besides these, there are doubtless other causes more or less obscure, since it may occur in a single individual in a stud where everything is well ordered.

Symptoms.—Some loss of flesh may be noticed before the frequent and voluminous passing of water is observed, but the probability is that profuse

urination began first. The animal loses spirit, is listless, dull, his coat stares, and he shows general signs of weakness. Appetite precarious, thirst excessive, and in a few cases the yard hangs out and urine dribbles from it, as if control were lost. Unless checked, rapid emaciation follows, and exhaustion, inanition, and death.

Treatment.—Good hygienic conditions, a light airy loose box, in the case of a horse, absolute rest, the best food, and a choice of it. The cruel folly of keeping the subject of diabetes short of water is to be deprecated, and an abundant supply of the best obtainable, acidulated with half a drachm of strong hydrochloric acid to the two-gallon bucket. Provided the nursing is good and the ration liberal, we may claim for iodine almost the character of a specific in this disease. The crystals of iodine, in one-drachm doses, are given in a ball, made up with sufficient linseed meal and treacle, every night. Some practitioners prescribe fifteen-grain doses of sugar of lead, and alternate it with drachm doses of powered nut galls.

DROPSY, ANASCARA, POT BELLY, ETC.

An accumulation of fluid in the abdomen or in the extremities is frequently referred to as dropsy. Similar conditions in the chest cavity are spoken of as dropsy on the chest, or chest founder. Dropsical swelling of the legs of horses is quite common, but its significance varies greatly. Dropsy of the limbs in human beings is regarded seriously, but with horses may be and often is but of slight import. It is desirable, then, to understand what is meant by dropsy.

The chief cause of dropsy of the abdomen is interference with the circulation of the portal system in the liver, and may be due to a variety of causes.

Dropsy of the abdomen generally follows on peritonitis if the attack does not quickly end fatally.

A good example of dropsy caused by liver disease is that in sheep, resulting from the ravages of flukes (*see* Flukes). Here the liver fails in its office, the muscles waste, and the belly becomes pendulous and distended with fluid. The legs are not prone to sympatheric swelling in these animals, but a similar condition in a horse would be accompanied sooner or later with swelled legs. A horse out of condition, weak from poverty, debilitated by disease or old age, or merely confined to the stable too long without exercise, will have swelled legs, which pass under the generic term of dropsy. Exercise will "fine" or cause the rapid absorption of many, indeed most, filled legs, and to the horseman such a state of things does not suggest any serious malady. On the other hand, the presence of fluid in the chest cavity, chest founder, is a very serious matter (*see* Pleurisy). It will be gathered from the above remarks that fluid accumulations, commonly described as dropsy, may have their origin in a variety of causes, and must be regarded as signs or symptoms of different disorders, and not as a disease in itself, to be combated by any particular treatment.

CHAPTER IV.

TUMOURS.

Any enlargement may be referred to as a "tumour" by surgeons, but the popular idea is of something dreadful. It is convenient to consider tumours under two principal headings, namely, malignant and benign. As a type of the malignant we may take cancer: for examples of the benign, the common warts; or elbow and hock caps, which were originally only an inflamed bursa (*see* Capped Elbow and Hock).

The malignant tumours, as the various forms of cancer, have the power of converting surrounding tissues into cancerous material. Benign tumours, however large, have not this capacity, but grow only to the inconvenience of, or disturbance of, the animal's functions. A capped elbow or an encysted wart on the face may be extremely inconvenient, and a mere wart upon the eyelid may indirectly lead to damaged sight, but when removed have little or no disposition to recur. The excision of cancerous growths or of others which form within the organs may be impossible, and the result is in any case uncertain. Anyhow, they are matters for the veterinary surgeon, and owners of animals should not torture them by quack remedies. A correct diagnosis is of the first importance, and if the animal's life cannot be saved his carcase may be utilised under professional supervision.

The tumours of tuberculosis and of actinomycosis have been described under those diseases, and the minor enlargements with which the intelligent owner can deal are treated of in the chapter on "Lumps and Bumps."

Chapter V.

DISEASES OF THE RESPIRATORY ORGANS.

Diseases connected with respiration attract attention more readily than do some others. A discharge from the nose, a cough, whistling, and other sounds, force themselves upon the notice of the least observant. In addition to these outward signs, there are to be heard a variety of sounds within, if the ear is pressed against the side of the animal, but they have little or no meaning for those persons who have never listened to them in health. By auscultation, by percussion with the knuckles, and, in the case of small animals, changing the position of the body, much can be learned of what is going on, and as to the alterations of structure which may have taken place. The stethoscope, so much favoured by human practitioners, may appear impressive when handled with great deliberation by a vet., but the naked ear pressed close upon the skin will afford more information. Motives of delicacy compel the use of an instrument by the medical man, besides the advantages offered by a fine hairless skin which will give passage to sounds. Unless the hair is previously wetted, animals are more difficult to auscultate, because their natural covering is a non-conductor of sound. The ear, pressed close, is the most satisfactory method of examination.

A great deal more than he wishes to hear is often the luck of the horse-owner, and the smallest of dogs will make a great noise when suffering from bronchial and laryngeal troubles. There may be no active disease in a horse, but if he "makes a noise," is a "bull," a "piper," or a "whistler," he belongs to the unsound class.

A cough that is soft and apparently giving rise to no distress in a pedigree cow may indicate tuberculosis. A slight husking cough among young stock or lambs may mean parasitic invasion of the bronchi, and a loss instead of profit on their feeding.

Enough has been said to indicate the importance of respiratory sounds in animals, and the desirability of ascertaining their meaning.

A whole volume would be required to deal with the varieties of respiratory sounds made by horses, and their importance warrants it. Here we must be content to point to a few of them. The natural to-and-fro blowing noise in the nostrils of a fat horse, or one out of condition, must not be mistaken for

whistling or roaring, nor the rattling over nasal mucus in a simple cold. Some horses are what are known as "high blowers." They make a noise when first put to their paces, and presently, when they get into a gallop, the breathing is quite normal. It would seem to be voluntary, or else due to a peculiar conformation. It is not unsoundness. A real whistler will make more noise as the gallop proceeds. But few horses snore when asleep, and when they do so it is usually from thickening of the membranes, or polypus, or some other obstruction high up in the nasal chamber.

Snuffling or rattling sounds are heard in all animals with certain catarrhal complaints which leave loads of muco-purulent matter loosely held in the nasal passages. Some have a disagreeable habit of blowing it out forcibly over one's person, and would seem to be excited to special effort by the close proximity of a silk hat. With a smaller channel and less mobile nostrils than the horse, the ox is found to make this snuffling sound more frequently, and pigs and dogs also suffer from snuffles.

Snoring in cattle, sometimes very loudly, is generally due to swelling in the pharyngeal region or back of the mouth immediately in front of the gullet. Thistle pricks and other foreign bodies set up an irritation which leads to the formation of pus of a kind that does not readily follow the rule of "pointing," or coming to a head and breaking. Exploration with the fingers will usually result in defining the enlargement, and the operator may be assisted by comparing the feeling and size of another animal that does not snore. The most prominent portion will be the thinnest, and the safest method of operating is to scrape through with the finger nail until the contained matter gushes out. The head is then promptly lowered, to prevent pus going the "wrong way" that is, drawn down the windpipe in the act of inspiration. No further treatment is needed. On the third day the noise may be greater than before (owing to the influence of the ragged sore), but from that time onwards it will cease altogether.

GRUNTING.

Horses which grunt when struck at are commonly suspected of being unsound in the wind, and as an auction yard test of a rough sort it has its value. It is not, however, reliable, as some of the best horses do it, and the finest of hunters will grunt at timber, although making no sound in galloping. Horses will grunt and groan—ay, and blow too—from pain in the bowels, and, in regard to the last-named symptom of pain, many mistakes are made in diagnosis.

Horses are occasionally met with which whistle or "roar" at intervals, and pass an examination as to soundness at other times. They are known to veterinary surgeons as intermittent roarers, and several law suits have followed upon the sale of such animals. The cause appears to be a nervous one.

ROARING.

It is agreed that the sound recognised by this name is produced by the act of drawing in the breath, not by expiration, as one at first imagines. It may be temporary only, as in acute laryngitis, but should always be regarded as serious, because so likely to become confirmed. This is more particularly the case where blood horses are concerned, the report of a favourite in training having a "cough" giving rise to widespread alarm in sporting circles, and a rapid depreciation in "price." Roaring is hereditary. It often follows upon a common cold, sore throat, or laryngitis, but not so frequently upon affections of the lungs. Many horses have become roarers without having apparently suffered from any of the diseases upon which the defect so

frequently follows. Mares are less often affected than stallions and gelings, and a roarer under fourteen hands is very rare. It is not confined to any one conformation of horse, but those with long necks and heads gracefully set, with fine clear throttles, and displaying the outlines of the larynx—the ideal thoroughbred—are the most frequent subjects.

Cause.—Many investigations have been made and many theories hotly argued, but the subject has made practically no advance for the last fifty years. In the case of confirmed roarers dissected after death, it is found that atrophy of certain muscles of the larynx has taken place, and this is

FIG. 12. TRACHEA TUBE WITH FOUR SHORT ARMS OF DESCENDING DEPTHS OF NECK, TO BE USED AS THE SWELLING SUBSIDES AFTER THE OPERATION (*Huish and Arnold*).

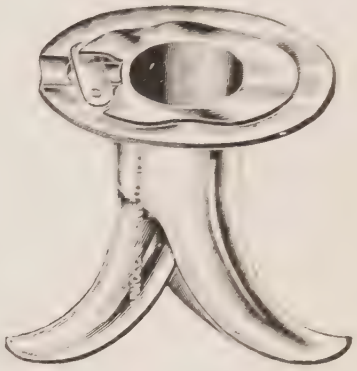


FIG. 13.

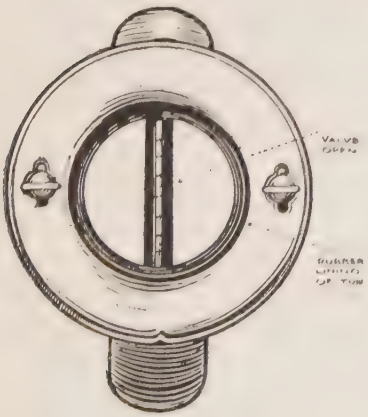


FIG. 14.

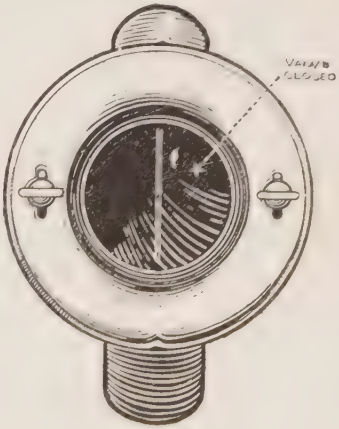


FIG. 15.

SHOWING OPENING AND CLOSING OF THE VALVES.

generally confined to the left side. That the nerve supplying these parts fails in its office is taken for granted, but neither microscopic nor chemical examination shows any alteration in its structure or composition which can account for its failure to convey the current. Besides this common form of roaring there are accidental ones, as compression of the facial bones from falls and blows; morbid growths in the air passages, lodgment of foreign bodies, abscesses following on strangles, the presence of parasites, diseased molar teeth, and penetration of an unopposed lower tooth into the upper jaw

and sinuses of the face. As a consequence of the latter, great accumulations of semi-solid matter have been found blocking the air passage and causing roaring. The writer bought for a pound a leg the best mare he ever had in his stables on account of her roaring from this cause (and being condemned as glandered). After the face had been evacuated she became quite sound. Apart from the atrophied condition of the laryngeal muscles, the other causes of roaring are rare, and once a horse begins to make a noise it is most likely that he will continue to do so, and that the defect will grow worse, perhaps slowly, perhaps quickly. If a chronic cough accompanies roaring, and it very frequently does, it will gradually increase. If, without this cough, the horse easily gets a sore throat, he will rapidly grow worse, each attack leaving its mark. Nearly all roarers are grunters, but all grunters are not roarers (*see* Grunting). A horse with a sore throat will cough on receiving very slight pressure from the finger and thumb upon the larynx, but a confirmed roarer is less sensitive, and may not give the required evidence whether pinched or threatened with a stick.

Treatment.—If a particular and removable cause, such as the case cited above, much can be done. If every cold and sore throat is regarded as serious, and counter irritation immediately applied, many cases of roaring will be averted. A sharp blister of mustard with a little turpentine will generally be sufficient, but later on biniodide of mercury (*see* Blisters) may be advisable, as more permanent in its effects. Frenchmen are rather fond of the hot irons for this purpose, but the writer is of opinion that blisters do the work as well, and, should the animal recover, there are no tell-tale marks upon the skin.

During the attack of laryngitis, or of common sore throat, the administration of chlorate of potash is recommended, as it has some influence in preventing fatty degeneration in muscles. Roarers are distinctly benefited by an oleaginous diet, and food given moist and in small bulk (*see* Chronic Cough and Broken Wind).

The operation of removing the left arytenoid cartilage was given an extensive trial in the British Army in the latter part of the nineteenth century, but proved a disastrous failure. While giving temporary relief, or apparently effecting a cure by giving a larger air passage at this portion, it is soon followed by further constriction, the parts fall in, and the last state of that horse is worse than the first.

VENTRICLE STRIPPING.

Since the earlier editions of this work were published, the operation of stripping the larynx has been revived, although abandoned eighty years previously by the Gunthers (father and son). Some sporting papers boomed the operation, but it is now recognised as affording very few real cures, a minority of ameliorations, and a majority of failures, besides which it is costly, and the animal has to pass a long time in idleness before it can be proved whether it will afford much or little relief. Anyone possessing an otherwise valuable animal may think it worth while submitting him to ventricle stripping, if he is willing to accept the odds.

If the subject of roaring is of such a type as to be worthless for slow work (which can usually be performed without serious inconvenience), it is better to resort to the tracheotomy tube (Figs. 12, &c). The insertion of a tube is a very simple operation, and the patient is immediately relieved. Many horses have won races with a tube in the windpipe, and hunters have been restored; but the man with a long purse seldom cares to ride to hounds for more than one season with a horse so fitted. Harness animals attract the loudly

expressed sympathy of the *woman* in the street who knows nothing of such matters. The most convenient portion of the trachea for operation is about halfway down the pipe, as here the muscles are thin and can be held aside while the tube is fitted. A rather long incision is made through the skin, and a portion of cartilage cut clean out; the instrument is then put in, and the horse may be used next day. There can be little more than inconvenience attaching to such tubes, as the trachea is a comparatively insensitive structure, but they accumulate mucus, and need to be removed and cleaned with a simple antiseptic frequently. There is also a disposition to thickening of the adjacent tissues, which calls for reduction after a time. Some operators place them very high up, where they are little seen, but the tissues to be severed are there much thicker.

COUGHS.

Coughing is not a disease in itself, but a symptom of many, and by its character forms an important aid to diagnosis. There are hard, soft, dry, moist, hollow, broken-winded coughs. Certain forms of indigestion, of heart disease, and dentition troubles are accompanied by cough. Taken alone, a cough will scarcely be diagnostic, but considered in connection with other symptoms, enables us to locate the trouble, and perhaps relieve it. Chest sounds are not so readily distinguished: they need special study to understand their meaning, while all of us are compelled to learn something of coughs, either in our own persons or by the infirmities of our neighbours.

Persons having the care of animals should note the chest sounds, as the careful groom will note the excretions and judge the state of a horse's digestion. There are too many persons in charge of animals who do neither; but he who would attempt the medical treatment of live stock when ill should begin by learning something of their functions when well.

COMMON COLD, CATARRH, RUNNING AT THE NOSE.

The chief symptoms of catarrh are familiar to most people, but the earlier ones are apt to escape notice. If these were observed and acted upon, the number of serious illnesses in horses would be reduced by fifty per cent. or more. It is going on working a horse with a cold already on him which so frequently leads to pneumonia and other complications. Animals are not able to tell us of the preliminary dryness of the nasal membranes and sense of fulness over the eyes which they feel, so that the defluxion of tears and running of watery fluid from the nose are the first attractive symptoms. Staring coat and shivering fits may have preceded this, and in some of the best stables where experienced men are employed the animal gets a so-called fever draught before a cold has time to develop.

The causes are sudden changes from cold to hot air, but more especially from pure to bad air. It is doubtful if catarrh is often contracted by cold air alone, but an animal exposed to a draught or to sudden alternations of hot and cold, and, when heated, allowed to cool too rapidly, is very liable to take cold. There are catarrhal affections passing under the common name of cold which, in the writer's opinion, are infectious, and never absent from close town stables. Young horses coming in from pure country air have to be "salted" or immunised by one or more "doses," before they can take their places side by side with the inured and comparatively immune slave.

Treatment.—Just as bad air is the principal cause, so is pure air the chief cure. If any reader needs convincing of this he should inquire into the results obtained by dealers who turn out to grass, no matter what the time of

year, the freshly imported horses with thick nasal discharges which make them for the time unsaleable. A well-ventilated loose box, bandaging and clothing, cleaning out the nostrils with a simple antiseptic (*see* Disinfectants), Steamed hay, soft foods, including a liberal allowance of linseed: these are the medical comforts needed, not a lot of drugging, for there is no specific. The great thing is to give time, and not put a horse to work until recovered. The principles above inculcated apply to all other species of animals affected with catarrh.

NASAL GLEET, CHRONIC RUNNING AT THE NOSE.

A chronic discharge from the nose, or one which does not desist after a cold has had ample time to clear up, is known as a nasal gleet, running at the nose, and by some other terms too objectionable for mention. All mucous membranes are liable to take on this condition as a sequel to the catarrhal, so that we meet with it as the "whites" in cows, as a discharge of a somewhat similar character from the urethral canal of male animals, and more especially from the nostrils of horses which have suffered from influenza and other severe forms of catarrh, such as haunt horse ships and badly ventilated stables. That a micro-organism is the probable cause, and that a previous inflammation of the membrane prepares the seed bed, is likely.

There are other causes for a discharge of a chronic nature, but having the same general appearance; injuries to the facial bones, deformities of the teeth, puncture of the upper jaw by unopposed lower teeth, abscesses, lodgment of foreign bodies, and the presence of parasites (pentastomes and æstridæ).

The common forms of gleet following on catarrhal affections are amenable to treatment, but the suspicion of glanders is always in the mind of the veterinarian, who will assure himself by periodic examination that there are no ulcers on the schneiderian membrane, or other indications of that disease (*see* Glanders).

Treatment.—While a discharge of this kind must be accepted as a sign of debility, and general treatment adopted in the way of tonics, local applications are essential to a cure in most instances. Such internal remedies as sulphate of iron, of copper, and bitter vegetable substances as gentian, are specially valuable (*see* Table of Doses), and must be continued for some length of time. Pure air is of the greatest value. Of this we have the most striking proof in the recovery of nearly all animals turned out to grass by the third-rate dealer who will not bear the expense of stable feeding for horses with no immediate prospect of being sold. Winter or summer, clipped or not, it is the custom of some men of this class to turn out all horses which have a running at the nose, and the writer has seen recoveries under these conditions when he expected fatal results from exposure. Without following an example so barbarous, we may learn from it to secure the utmost amount of pure air available, and to supply warmth by clothing if we must choose between good air that is cold and bad air that is warm. Feeding from the ground facilitates drainage, as does anointing the nostrils with vaseline or lard. The most effectual remedies are those which come in contact with the diseased membrane, either by syringing up an astringent lotion or *puffing* up a powder with an instrument known as an insufflator.

A two or three per cent. lotion of alum, of sulphate of zinc, of chinosol, or of sulphate of copper should be used each for a time, unless one of these agents proves much more effective than others. It happens sometimes that gleets prove very obstinate with one well proved remedy, and yield readily to another.

Iodoform is the most valued substance for insufflating, but it can only be accomplished with a proper instrument. This, however, is a comparatively inexpensive affair. The patient must be coaxed as well as compelled to hold still, while submitting to the peculiar sensation of having injections or insufflations introduced up the nostrils.

The lacteal discharges or gleets from which sheep and pigs suffer are frequently due to parasites, either pentastomes or bots, for which *see* Parasites, Sheep Bots, and Snuffles in Pigs.

SORE THROAT, LARYNGITIS.

Sore throat may accompany or follow upon a common cold, or the disease may be almost confined to the region known as the larynx. Sore throat often means an inflamed condition of the pharynx and back of the tongue, in which the lining membrane of the larynx scarcely participates, but genuine laryngitis is an extremely painful and distressing condition. The prolonged and difficult indrawing of the breath, accompanied by a harsh and peculiar noise, makes the diagnosis of laryngitis very easy.

Treatment.—Immediate relief is to be sought in counter-irritation, mustard and vinegar, or turpentine, or hot fomentations to the throat, together with inhalation of steam from a deep nose-bag, in which scalded bran has been placed with some friar's balsam or eucalyptus oil. In some very acute cases it may be necessary to perform tracheotomy to avoid suffocation during the spasms. An electuary composed of extract of belladonna, nitrate, and chlorate of potash, one drachm each, with sufficient honey to make a convenient paste, may be smeared upon the back of the tongue at intervals of a few hours, taking the above quantities as an average dose.

Linseed tea should be prepared and all soft foods offered which the animal may be persuaded to take (*see* Management of Sick Animals). The sequelæ are most to be feared, as thick wind, and roaring (*see* Roaring).

Dogs and other small animals can have flannels wrung out with hot water constantly applied and the moisture kept in by a covering of oiled silk. They can also be made to gargle in certain forms of sore throat.

BRONCHITIS.

All the domesticated animals are liable to this disease, and from the same causes as induce ordinary colds. It is recognised by the peculiar sound of the air passing over the rough and thickened surface of the bronchial tubes, and often to be heard at a distance. A distinction is drawn between acute and chronic bronchitis; the former is the more severe, and may result in the latter. Careless drenching is a cause of bronchitis when irritating substances go down the trachea.

In the usual way there are distinct stages of the malady. The membranes are at first dry, and it is at this stage most suffering is endured. After this congestive stage a copious mucus is exuded, and coughing is a natural effort to get it up. During the subsequent period the exudation is so thickened that it is with greater difficulty dislodged.

Treatment.—The fever and irritation of bronchitis are accompanied with great depression and debility. Counter-irritants from the top of the windpipe to the breast, and again behind the shoulders, are recommended, also inhalations (*see* Laryngitis, and the food and management advised for it). During the dry early stage, give ounce doses of bicarbonate of potash in each bucket of drinking water, and every four hours a mixture of acetate of ammonia, ipecacuanha wine, and syrup of squill (*see* Table of Doses). Later on, when the passages seem blocked with mucus, eucalyptus, terebene, and mineral acids are advised as remedies to reduce excessive secretion. A

liniment of equal parts of soap liniment and laudanum, rubbed daily into the throat and down the course of the windpipe, is found to relieve the oppressed breathing. In the convalescent stage, when the secretion is thick and somewhat purulent, a ball consisting of the following ingredients, and given twice a day, will prove helpful—

Extract of belladonna	1 drachm.
Camphor	1 ,,
Nitrate of potash	1 ,,
Extract of gentian	1 ,,
Stockholm tar	1 ,,

Honey and linseed meal, enough to make a ball weighing one ounce. This dose may be given to a horse or bullock and a proportionate quantity to other animals, for which *see* Table of Doses. Constipation should be combated with linseed oil, and on no account should drastic purgatives be administered (*see* Sick Foods, etc.).

FAT STOCK SHOW DISEASE—BRONCHIAL CROUP.

Showing live stock has doubtless done much to improve it, and to advertise our exceptional position and capacity as breeders, but it is the seamy side of it which is often presented to the veterinary surgeon. At all shows where a large number of fat animals are placed in a building there is danger of air contamination, despite the best of hygienic arrangements possible under the circumstances. When, as happened on more than one occasion, a dense fog has settled over London or Birmingham in the show week, a condition of things arises which induces a respiratory disease known as above. The smoke and fog and hot air irritate the tracheal and bronchial membrane, and a fibrinous exudation takes place. The symptoms are indistinguishable to the ordinary cattle man from those of inflammation of the lungs and bronchial tubes; indeed, it was at first supposed that pleuro-pneumonia of a virulent type had broken out at one of the Islington Shows. The disease runs its course so rapidly that slaughter is in most cases necessary before the carcase is rendered valueless. As the subjects have generally very much more than butcher value, it may be worth while to remove to a more airy place, if such can be found, and cause the animal to inhale a vapour of water impregnated with eucalyptus or phenol. Some individuals have been saved by introducing a pipe into the trachea (*see* Tracheotomy).

BROKEN WIND—CHRONIC EMPHYSEMA.

Broken wind is a form of unsoundness more frequently met with in farmers' horses than among those belonging to any other class. This well known fact points in an indirect way to the cause. The offal of the farm is commonly utilised at home, and experience has proved that damaged forage, such as musty and mowburnt hay, are active factors in its causation. The lungs of broken-winded horses have been frequently examined after death in the expectation of finding the air cells ruptured into one another, but this is not always to be seen, and the exact pathological condition is not at all clearly defined. From the observed causes, such as distension upon comparatively innutritious food, we may suppose that some nervous influence is at work, some reflex action through the great pneumogastric nerve. Roaring has been shown to be due to imperfect innervation of certain muscles of the larynx (*see* Roaring), and there is reason to suppose that broken wind is similarly related. The atrophy of certain portions of the lung structure and dilatation of others to be seen in cases of long standing would seem to be the result rather than the cause of the disease.

Symptoms.—The two prominent symptoms are a peculiar cough known as a broken-winded cough, and a double movement of the flank in expiration. Horses suffering from this malady are apt to have a large and pendulous belly, and to frequently emit gases per rectum with more or less explosive sounds. Broken wind may begin to show itself immediately after an illness affecting the lung substance, or come on by slow degrees without any previous trouble.

Treatment.—There is no cure for this affection, but the condition may be so ameliorated by judicious dieting and management that the animal may have many years of usefulness before him. It is important to give the best of food in smallest bulk, and nothing absolutely dry. Dusty forage causes a relapse at once. Linseed should form a large portion of the horse's diet. The corn should be sifted, given with only just enough damped chaff to ensure proper mastication, and if a little hay is allowed on rest days as a treat it should be damped. A good horsemaster will have linseed tea made fresh daily, and poured over the evening meal (*see* Management of Sick Animals).

Water should be given sparingly, the greater volume being partaken of at night, after the work is done, and early in the morning, and none within two hours of going out. Some men will keep a broken-winded horse in good spirits and capable of a fair day's work by such management, while others, careless of these precautions, will soon have a useless animal on their hands.

In the way of medicaments, an occasional dose of linseed oil may be given, unless the bowels are too much relaxed by the linseed in the ration. If linseed tea cannot be made, a wineglassful of linseed oil may be mixed with the food. An occasional sedative cough ball will prove helpful, when the cough or breathing is worse than usual. There is no doubt that habitual dosing with arsenic (*see* Hydrochloric Solution) has a decidedly beneficial action on broken-winded horses, but once begun it must be continued, or the patient rapidly falls out of condition and health. Beginning with five-grain doses in solution, poured over the food, it may be increased to three times that amount with perfect safety. Very large quantities are often given without bad effects, but this depends largely upon the stomach being full of ingesta or otherwise. A number of horses have been poisoned by a comparatively small quantity of arsenic, after a long journey and on an empty stomach, but, given with the food, the quantities above recommended are entirely free from danger. Tar and camphor, antimony and salines, all act favourably in this disease (*see* Table of Doses; *see also* formula for chronic cough ball), and rock salt or chalk should be always found in the manger.

A system of "loading" broken-winded horses for sale has long been successfully practised by a certain class of dealers. It is said to consist of fasting, withholding water, and administering a number of balls composed of tallow with shot, whereby the stomach is mechanically held low, and the lungs allowed the fullest amount of play. Post-mortem examination has shown the presence of these substances, but the large purchases of arsenic made by these men, and the boldness with which they give it and antimony, with tar and other drugs, leads the writer to think that their secrets have never been fully disclosed to the faculty. The would-be purchaser with any doubt in his mind should not close a bargain until he has seen the animal after a deep draught of water and a feed. Loaded animals will deceive the "very elect," if only cursorily examined in the bustle of a fair, but the "setting" does not last many hours.

CONGESTION OF THE LUNGS.

The veterinary meaning of this term is not the same as that intended by the medical man. The latter speaks of congestion of the lungs as something rather less serious than inflammation of the lungs or pneumonia. In

respect to horses, we mean not merely a threatening pneumonia or disease of the actual lung substance (parenchyma), but an engorgement of the pulmonary vessels which are found in the lungs for the purpose of aeration. They are a different set of vessels from those which supply the lung tissue with nutrition; they act for the whole volume of blood contained in the body. This form of congestion with which we have to deal is commonly caused by excessive exertion in an animal unprepared by exercise and diet to call forth its greatest powers. "Condition" means, by a carefully regulated diet and training, such development of the circulatory and muscular systems as will result in the easy performance of tasks which would put a severe strain upon a fat and unprepared animal. Horses taken up from grass are soft or out of condition, unfit by previous occupation for sustained labour. Horses which have been "made up" in dealers' stables so as to look big and full of flesh and spirit are in no condition for hard work, and, like those coming from grass, are specially liable to congestion of the lungs, if suddenly put to it. Plenty of horses condition themselves by steady work, until, if called upon for severe exertion, they are capable of it, but for hunting and racing, indeed for anything like excessive exertion, condition must be attained by suitable feeding and gradually increased exercise.

Debility from other causes, or excess of rich blood, predispose to congestion of the lungs.

Symptoms.—These may come on while on the road or in the hunting field, when the animal is found to labour in breathing, and quite suddenly "give out" in the middle of a run. The nostrils are dilated, the eyes staring, and the mucous membranes dark in colour, the little vessels standing out conspicuously. The animal stands with forelegs wide apart, head lowered, and every evidence of severe depression. The flanks move quickly, the heart may be heard labouring tumultuously, if the ear is placed at the side of the chest, but the pulse is weak and fluttering and small. The heart is vainly trying to pump through the blood in the congested vessels. If not relieved, horses die in a short time. It is quickly one way or the other with them in this complaint; the circulation is either restored or the stagnation results in rapid decomposition and death.

Treatment.—Directly the animal's state is observed, he should be dismounted or taken out of harness, his head to the wind, a stimulant procured, and his extremities and surface generally whisped, in order to assist in the distribution of blood. The contents of the hunting flask (and that of your nearest friend) may be given, and perhaps save the animal's life, for early help to the labouring heart will turn the tide, and a really good horseman will recognise the first symptoms of distress and save him. It was the gross ignorance of our recruits in South Africa* in horsemastership which contributed so much to the terrible death roll. Horses were landed in totally unfit condition for the march, and the necessity of war compelled them to be sent on to the front with scarcely any preparation. The new men, untrained to care for anything, would only discover something was amiss when their mount began to "go as if he was drunk," and presently fall in his tracks. The average life of horses during my period of service was ten weeks only. A very large number of deaths were from congestion of the lungs, and of the kind we are considering; not from cold or sudden exposure after the stifling hold of the ship, but from exertion for which their hearts, lungs, muscles, &c., were unprepared. If ever the lancet or the fleam are to be used with advantage, it is surely in sudden engorgement of the lungs. A powerful stimulant, such as

* This was not the case in the late European War, the animals being steadily conditioned at Remount Depots.

half a pint of whisky in a pint and a half of water, should first be given, and within five minutes an attempt made to draw blood from the jugular vein. The letting of three or four quarts of blood will mean less volume of it to pump round, and later the administration of fluid will still further assist to thin it down. If the horse will drink water with the chill off he should not be stinted. Many modern practitioners have lost faith in counter-irritation to the chest, but my own experience is entirely in its favour, and I would get a smart mustard plaster on as soon as possible. Smaller doses of alcohol, as three or four ounces of whisky or two ounces of spirit of nitrous ether (sweet spirit of nitre) freely diluted, may be given every two or three hours, if there are no signs of improvement. The ears should be pulled and the legs hand-rubbed and bandaged, and every effort made to excite circulation in the extremities, but the box should be airy, and if necessary the animal's head tied up to an open window. There is a disposition to put the head in the worst corner of the stable and hang it down, where the same bad air will be inspired over and over again. A change to ounce doses of tincture of cardamoms and like quantities of tincture of gentian may be made as improvement is noted. If the patient shows a disposition to lie down, he is probably far on the road to recovery, but this inclination must not be mistaken for the despairing manner in which some horses will almost throw themselves down. It is not usual for horses to lie down at all when suffering from acute lung trouble, but some will do it; text books to the contrary. They do not remain down long, as they find it more difficult to breathe in a recumbent posture. As a rule horses either completely recover—and that in a short time—or die; they do not frequently have any subsequent defects of wind, but a low form of inflammation of the lungs, such as follows upon laryngitis or even common colds. (*See* Roaring and Laryngitis.)

INFLAMMATION OF THE LUNGS—PNEUMONIA.

On a previous page it has been explained that congestion of the lungs affects the vessels of a system provided for the renewal of the whole blood of the body by bringing it into contact with the air inspired. In pneumonia, the lung substance and its own nutrient vessels are first and chiefly concerned, although the pulmonary ones may subsequently become involved. The causes are not the same, or not commonly so (*see* Congestion on previous page). Pneumonia may be the outcome of a severe chill, exposure to wet and cold, and draughts, or a sequel to exhausting diseases, as glanders, influenza, and strangles, or specific infection.

Symptoms.—These are not nearly so acute as in pulmonary congestion, and owners are often quite surprised at being told that anything very serious is the matter. Careful examination will result in the discovery of increased number of pulsations, with lessened force, a temperature of anything between 103 and 107 degrees of Fahrenheit; a dry cough, cold ears and legs, or some legs cold and some normal. The membranes of the eye and nostril display a russet tinge, and the tongue feels clammy. The animal does not lie down, but wanders round in an unhappy frame of mind, picking a mouthful of food now and again and failing to eat it. The breathing is what is known as shallow (quick, and not taking a deep and satisfying inspiration which fills the lungs and distends the chest walls). The mucous membranes of the bowels seem to be in sympathy with the chest, and somewhat hardened fæces are passed, together with flakes of mucus. Such are the common symptoms of pneumonia, when free from complications, but the general practitioner usually finds an area of pleurisy with it—which aggravates the case (*see* Pleurisy and Pleuro-pneumonia). Rapid recovery never takes place, as in congestion of the lungs, but an illness of a month's duration may be

expected, however favourable the case, before a return to usefulness can be looked for. There are two periods during pneumonia when the animal's life is most in danger; the early one, in which the temperature runs so very high, and later, when consolidation of the lung substance takes place. There is good reason to suppose that morbid products in all cases result, and that more or less lung is hepatised or resembles liver, and during this stage only a portion of lung is available for its ordinary function. This limited area of workable lung soon fails, if the patient is called upon for any exertion, the diseased portion is disturbed, and morbid products entering again into the circulation produce fatal effects. This is probably what happens when a convalescent returns to work too soon.

A rusty-coloured discharge from the nostrils, thin and evil-smelling, is an almost invariably fatal symptom in horses.

While it has been observed that horses seldom lie down when suffering from severe chest affections, it may be noted that cattle, sheep, dogs, and swine do so, during the greater part of the time. The broad keel of the breast bone and general anatomical arrangement of the ox and sheep offer a position of comfort denied to the horse, whose sternum is sharp and ribs at a different angle. Inflammation of the lungs or pneumonia, as a distinct and separate disease, sporadic or accidental, and affecting individuals, is not common among cattle and sheep, but is more frequently associated with specific diseases, as pleuro-pneumonia in cattle and broncho-pneumonia in lambs and sheep, in connection with filaria (*see* Husk or Hoose).

Swine may be affected with pneumonia from exposure to cold and wet, and especially to cutting draughts. The pneumonia of swine is frequently complicated by endocarditis or inflammation of the lining membrane of the heart, with resultant cauliflower-like growths which interfere with the heart's action. It is associated too with rheumatism, to an extent we seldom meet with in horses, cattle, or sheep, but even more frequently in dogs.

There is a septic or contagious form of pneumonia met with in horses which when it occurs on board ship often proves disastrous. In crowded and ill-ventilated town stables it soon assumes dangerous proportions, but it is now quickly recognised by veterinary surgeons, and the necessary segregation and disinfection practised. Sometimes, however, it happens in the poor underground stables of cabmen and others who do not employ a qualified veterinarian, and partly recovered cases find their way to sales and spread the disease. Some portion of lung remains infective, and when such a horse is introduced into a stable of healthy animals, or on a ship with but small air space, fatal cases soon result. Some of the worst losses during the great Boer war occurred in shipments of horses from England and Ireland, while septic pneumonia in shipments of Canadians, South Americans, and Australians was comparatively rare.*

Treatment.—There is a difference of opinion as to the value of counter-irritation to the sides of the chest, old-fashioned practitioners advocating mustard or other stimulating applications, and the new school altogether forbidding it.

There is general agreement as to the importance of good air and hygienic conditions: the loose box for horse or beast, with good drainage, and plentiful clean and soft bedding if disposed to lie down; fresh water, on a level with the patient, frequently renewed; floors kept sweet, and disinfectants freely employed. Strong purgatives are forbidden, but the tendency to constipa-

* There was a period during the late European War when septic pneumonia threatened to get beyond control. The losses were heavy indeed, but drastic measures proved in the end successful.

tion, which accompanies all high temperatures, may be combated, by saline laxatives or oil; oil preferably for horses, swine, and dogs, and salts for cattle and sheep (*see* Table of Doses).

To reduce temperature, ease pain where pleurisy is a complication, and promote what we should call expectoration in human beings, we give acetate of potash in solution, nitrate of potash, chlorate of potash, and bromides. Two or three doses of tincture of aconite are advocated for horses and cattle in the early stage, but they must not be continued. Alcoholic stimulants are very generally employed with apparently good results.

A stimulating draught, which may be continued three times a day without bad effects, and as a tonic, is what is desired after the first two or three days. The following may be recommended in the second stage of any of the inflammatory chest affections of horse or ox, and in proportionate doses for other animals:

Compound tincture of gentian	1 ounce.
Compound tincture cardamoms	½ „
Chloroform	20 drops
Sweet spirit of nitre	1 ounce.
Water or thin gruel	1 pint.

Dogs are benefited by an emetic at the onset of the disease.

When the heart is struggling feebly during the early part of the attack, digitalis is prescribed, and if not persisted in too long, but changed for some other heart stimulant, is doubtless beneficial. There are cases, especially in horses, where fair progress has been made up to a certain point, and there the patient "sticks," remaining more or less of an invalid. This is generally due to exudations, which are not cleared up, and should be treated with iodide of potassium and tonics, good feeding and nursing, and invalid foods (*see* Sick Foods).

PLEURISY, PLEURITIS, CHEST FOUNDER, WATER ON THE CHEST, HYDROTHORAX.

The membranes which cover the lungs and line the cavity of the chest are called pleurae or pleural membranes, the inflammation of them is known as pleurisy or pleuritis. The later symptoms of accumulated fluid in the chest gave rise to the older nomenclature—water on the chest, chest founder, dropsy, &c.

In some veterinary books it is separately described, and indeed often occurs as an independent or separate malady, but so frequently is it associated with pneumonia that the every-day practitioner quite commonly expects to find both together.

Causes.—Chills, exposure to hardships, external violence, and probably rheumatism; the common causes of chest affections.

Symptoms.—Slight shivering may be noticed or standing up of the coat and coldness of the surface of the body, generally followed by acute pain, which has been mistaken for colic, as the horse looks round at short intervals, gruffs or groans, paws with his front feet occasionally, but not in the angry way which accompanies abdominal pain. In many cases, no doubt, there is the painful stitch in the side known as pleurodynia, because the intercostal muscles participate in the inflammatory action. Pressure of the knuckles on the side of the chest causes the patient to flinch, and perhaps utter a groan, while turning in the stall is extremely painful, and walking evidently distresses the animal so that he takes very short steps. There is some arching of the back, and a countenance indicating extreme dejection. The breathing is short and painful, a full inspiration being impossible without causing the most acute pain. The temperature, as in all inflammatory diseases, runs up,

there is a disposition to cold extremities, to constipation and high-coloured urine. A short hacking cough, so painful that the animal is afraid to give expression to it.

During the dry stage, friction sounds can be heard on pressing the ear against the sides of the ribs; it is as if one heard sheets of paper slowly rubbed against one another. This stage is soon followed by a pouring out of fluid, with relief of the more urgent symptoms. This serous or watery fluid is in cases of recovery taken up again or absorbed, as it is said. During its formation, and in bad cases, the ear applied to the chest walls will detect a sound as of water dripping into a receptacle, and the sound as of distant sheep bells is sometimes noted. Splashing, as of water falling from a height, describes the sound in others. If resolution or absorption does not take place, the fluid undergoes changes which result in adhesions between the lungs and the chest walls or the diaphragm. These bindings are often met with at the slaughter-house, where no suspicion of lung trouble had ever been entertained. In some instances the fluid does not become organised in the above manner, but septic matter is introduced, the fluid decomposes, and the patient dies. Death too ensues when the fluid steadily increases in volume and the power of absorption is lost.

Treatment.—The hygienic conditions advised for pneumonia in the previous pages are applicable here. With regard to counter-irritation, it is surely in pleurisy that it should be employed if ever. The seat of inflammation is so near to the surface that the time-honoured theory of drawing out an inflammation by producing another has the most favourable opportunity of exercising its beneficial effects. Speaking from personal experience, I cannot but advocate it most strongly, as I have no power of observation if I have not seen the most marked effect in half an hour, and on many occasions. A dressing of mustard and vinegar, plus a little turpentine if a woolly-coated animal is the subject, is advisable (*see* Blisters).

Some practitioners have a preference for hot compresses or rugs dipped in hot water and frequently renewed. If the latter is thoroughly done, without any intervals during which the sides may receive a check from evaporation, it may be nearly as good as mustard, but only in a few favoured situations can such nursing be obtained, while the mustard is to hand in every farmhouse.

Pleurisy coming on suddenly in a vigorous horse or beast can be combated by blood-letting; there is no real danger in taking a fair amount of blood from the jugular vein (*see* Bleeding). Pigs and dogs can be given a dose of emetic tartar sufficient to cause vomiting.

The treatment recommended for pneumonia may be adopted for pleurisy, but in the later stages of pleurisy there is probably an amount of fluid exudate to deal with which calls for larger doses and a longer continuance of those agents with a reputation as absorbents. Iodide of potassium and colchicum are known to promote absorption, and this may be said of digitalis and nux vomica. Iron helps to build up red blood corpuscles and restore tone. A very good combination is to be found in quinine dissolved in tincture of iron and given dilute as a draught twice a day.

HYDROTHORAX.

Water on the chest, as will be seen if the reader has perused the above notes on pleurisy, is a result of another malady, not a disease in itself. It may follow on any inflammation of the chest contents, but chiefly as a result of pleural inflammation.

Treatment.—Tapping or withdrawal of the fluid by introducing an instrument similar to that employed for hoven between the ribs gives temporary

relief, very large quantities of fluid being often obtainable, but any permanent good result is very doubtful. Tapping is now adopted early in the disease and with marked benefit.

PLEURO-PNEUMONIA.

To the stockowner pleuro-pneumonia has usually but one meaning; it stands for the infectious disease of cattle which wrought such ruin in a previous generation, and has since made rare appearances, only to be stamped out promptly by a Department which at least deserves praise in this connection.

There is, however, a sporadic or accidental form of pleuro-pneumonia which is not infectious, and has been referred to already under the headings of Pneumonia and Pleurisy, and treatment advised. For the infectious form we have no remedy; the State demands that we shall give notice of its existence, and affords us a measure of compensation for compulsory slaughter, both of those affected and others in contact. There would seem to be about 25 per cent. of cattle immune or not very susceptible to this disease, and something like 60 per cent. of recoveries, but it has been so conclusively proved that areas of diseased lung may remain in animals which have apparently recovered, and become again a source of infection, that the wisdom of slaughter is no longer seriously contested. Protective inoculation has been practised, but its value is still doubtful. The chief business of the stockowner is to get a correct diagnosis, and give notice to the police. The sanitary authorities, under a Ministry of Agriculture Inspector, undertake the maintenance of a cordon around the infected premises, and it is useless to kick against their proceedings. A good citizen should afford every reasonable assistance if he cannot cheerfully contemplate what, in the case of a dairy farmer, generally means ruin.

Chapter VI.

DISEASES OF THE EYE.

All the domesticated animals are subject to eye troubles, some of which are peculiar to quadrupeds and others common to mankind. The structure or anatomy of the eye can be studied in any work on physiology, and excellent descriptive matter, admirably illustrated, will be found in the *Encyclopædia Britannica*, at every public library, if the reader has no other work available.

The chief differences in the eyes of animals from those of men consist in a retractor muscle which draws the globe backwards, and a haw or "third eyelid," which sweeps the front when the retractor acts. This provision for clearing away flies and other foreign bodies is not given to men with fingers. In them the haw (Caruncula lachrymalis) is very small and of no service in the matter of wiping the globe. Neither is a retractor present, because not required. Animals are enabled to see in a very low medium of light by reason of the *Tapetum lucidum*, or luminous carpet at the back of the eye.

SIMPLE INFLAMMATION, CONJUNCTIVITIS, OPHTHALMIA.

An ordinary inflamed eye, such as is often caused by insects, by flicks of the whip-lash, by lodgment of a husk, or hay chaff, by standing in a draught, or as a symptom of a cold, is a familiar trouble to most men who have kept animals. The priceless Derby winner and the common or garden cat, with

all the other more or less valuable animals, are liable to these troubles. Only in the result to the owner lies the difference. A white spot, as the sequel, on the eye of a valuable horse may reduce his price by tens of pounds. In the case of a cow she can see to produce calves and milk, and graze as well as before, but it will be a cause of some depreciation in a pedigree sale. Dogs and cats are of all values now, and any detriment to soundness of vision will therefore be proportionate. Some of the causes have been mentioned, and, when it is known that no foreign body is present, interference will be unnecessary. If a hay-seed or a fly is suspected, we must endeavour to get it out before we can hope to remedy the trouble. Whatever the cause, there will be the common symptom of closure of the lids, soon followed by swelling of them, and the escape of tears which run down the check and very soon scald it. The third eyelid or haw protrudes as if in sympathy and with a desire to shield the front of the eyeball. The covering membrane (conjunctiva) is very red, and the little blood-vessels will be found standing out like cords. These symptoms may arise from a blow on the outside, or in connection with a torn eyelid from the regrettable practice of leaving nails in the walls of stables.

Treatment.—It is important to allay inflammation quickly if we would avoid structural alterations. These it is which should make us regard every inflamed eye as a matter of serious importance. If an examination for foreign bodies is necessary we may take advantage of the discovery of cocaine, and throw upon the sensitive eyeball a few drops of a 10 per cent. solution, waiting five minutes for its anæsthetising effect, when the sufferer will permit us to open the lids and perhaps remove the foreign body with very little trouble. Without this drug the animal will scarcely allow us to approach the injured member, and we had formerly to resort to such extreme measures as casting in hobbles before a highly nervous horse could be dealt with. A powerful syringe will sometimes dislodge a body which we fail to see or grasp with forceps or remove with a feather or camel-hair pencil. Warm water of the temperature of the body should be used (*see* Temperatures, etc.). Further treatment consists in warm fomentations with a decoction of poppy-heads or aqueous solution of opium ; keeping the animal in the dark, or covering the painful member with a soft cloth or other suitable eye-shade. No permanent bad results may be expected from the mere lodgment of a foreign body for a short time.

Whip strokes and all other forms of violence to the outer membranes usually produce acute inflammation from a central spot where contact occurred and inflicted more or less of a wound, insufficient at the time to rupture the eyeballyet incapable of repair without a scar, which is what a nebula or cloud upon the cornea really is. It may be considerably modified by judicious treatment, but never wholly eradicated. A wound on the front of the eye, whether as the result of violence or death of structure from some specific disease like distemper in dogs and cats, takes the form of an ulcer—a ragged hollow space—of varying form and size, but showing unmistakable loss of membrane. Any inflammation of the conjunctival membrane or cornea underneath it which does not quickly subside results in opacity of a part or the whole of the front of the eye. Lymph, resembling milk, is deposited between the fine layers of which the cornea is composed. The patient may be quite unable to see, on account of this opacity, but the owner may hope in most cases that it will be presently absorbed when the inflammatory action has subsided. This is perhaps the best place to protest against the cruel and ignorant practice of treating such a condition of this intensely sensitive organ as though it had a false membrane or adventitious growth *upon* it, to be got rid of by caustics, such as ground glass, sugar, sulphates of copper and zinc, and

nitrate of silver. Blowing ground glass or powdered white sugar through a quill on to the surface of the eye is one of the favourite practices of the unenlightened "coper." The practice has some foundation, however, as will be seen later.

CATARACT, SPOTS ON THE EYE.

White spots or opacities of various shapes occurring on the front of the eye are erroneously called cataract by many people otherwise familiar with diseases of animals. They are the scars or cicatrices of wounds or else of specific ulcers—in horses generally from outward violence, in dogs and cats as the result of ulcers during the distemper. In the fly season cattle may get them as a result of irritation and rubbing their heads and horns into banks or hedgerows and from the laceration of brambles; or blows with sticks or whips, as in the case of horses. The sheltered eye of the pig seldom receives injury. Its structure is the same as other quadrupeds, and what has been said with reference to other animals applies to pigs.

CONSTITUTIONAL OPHTHALMIA, MOON BLINDNESS.

Besides the common inflammation of the eye previously referred to (page 91), there is a disease which may be said to come from within. Exciting causes perhaps assist in its development, but so far as our information goes it may arise spontaneously from some obscure constitutional condition in horses.

The symptoms previously described as denoting simple ophthalmia are present, but in a modified form. It is not usually so acute. It is however far more serious. Other and deeper structures are involved. The inflammation does not quickly subside, but the case drags on for days or weeks. The opening between the lids acquires a three-cornered appearance. There is a yellow or orange tint observable within the chambers. The little black bodies which hang down over the curtain (iris) look ragged, and in bad cases the globe generally looks full of milky fluid going on to that of a partly boiled white of egg; at which it may permanently remain. With or without treatment the inflammation subsides sooner or later, and from the first attack complete, or apparently complete, recovery may take place. The disease will almost certainly recur, and with each fresh invasion more or less structural change will take place. The iris, the lens, the aqueous and vitreous humours all participate more or less in the inflammation. The first may become attached by floating lymph, which is later on solidified like the boiled white of an egg before referred to. Its function of expansion and contraction (to admit more or less light as required) will be impaired. The lens may have permanent opaque spots within its onion-like layers (lenticular cataract), or its investing membrane be clouded by similar deposits (capsular cataract). The aqueous chamber, which in health is filled with limpid colourless fluid more transparent than the finest glass, may be filled with a milky substance and subject to the same hardening process referred to in connection with the iris and lens. The vitreous humour which occupies the greater part of the globe, and so called from its resemblance to molten glass, may be blue, white, or yellow, with degenerative changes, and so, in one or other of the ways described, vision will be imperfect or destroyed. Any or all of these sequelæ of inflammation of the globe of the eye may be termed cataract by the horseman, but the surgeon recognises only the two conditions of the lens (above described) under that name.

There has been a recurrence of the graver forms of ophthalmia of late years, a fresh "strain" seeming to have been introduced from the Western Hemisphere. Readers who desire a better understanding of the subject should consult Mr. Henry Gray's translation of Nicolas' Veterinary Ophthalmology.

Treatment.—Assuming that some rheumatic or gouty principle in the blood is responsible for this specific, constitutional, or periodic ophthalmia, we may commence its treatment by the administration of a good purgative dose of aloes (*see* Physic), while affording such relief by fomentations as have been recommended for common or simple ophthalmia, but we can do more. We know now that iodide of potassium may be given in large doses (*see* Table of Doses) over a considerable period with safety to the general health of animals. It is the most effectual remedy in exciting absorption, or, perhaps we should say, in limiting the production of inflammatory products in the eye. Fomentations containing extract of belladonna, a drachm rubbed down in a pint of hot water or sulphate of atropine dissolved in the proportion of four grains to the ounce, is advised for the purpose both of alleviating pain and keeping the iris moving. Belladonna, as readers may remember, is one of the things that dilate the pupil of the eye, such dilation being caused by the contraction of the radiating muscular fibres of which the iris is in part composed. When the action ceases the effect of light on the circular order of fibres will cause contraction of the pupil. If light fails to stimulate, morphia or other preparations of opium are used which have the well-known effect of contracting the pupil. If, then, its muscular fibres are kept moving, first in one direction and then in another, the binding down by inflammatory products is prevented while as yet they are semi-fluid, or not "organised," as it is termed.

The comfort of an animal suffering from inflammation of the eye is undoubtedly added to by frequent anointing with cold cream or wool fat, vaseline, lard, or spermaceti ointment; these, applied to the lids, enable the scalding tears to escape and prevent the accumulation of a waxy discharge around them.

The cheeks, down the course taken by the tears, should be liberally anointed in the early stage of the disease, or the hair comes out and tells a tale of misfortune long after the eye is restored.

ULCERATION OF THE EYES (CORNEA).

After an inflammatory attack there is frequently left an opaque spot or a diffused cloud covering a considerable portion of the front. It follows on that disease known as "pink eye" in America, and influenza in Britain. It is also a sequel to distemper and influenza in dogs and cats, and any exhausting constitutional disease which may result in impairment of nutrition of the cornea. Starvation, without active disease, will sometimes cause ulceration of the cornea both in man and animals. There has been no prolonged famine in which an exclusively starch diet has been the sole food that has not been followed by cases of ulcerated cornea in man.

Treatment of Ulceration of the Eyes.—If resulting from an injury that has not liberated the fluid contained in the ante-chamber, there will be active efforts on the part of nature to effect immediate repair. If the cornea breaks away and an ulcer is formed as the result of distemper in dog or cat, or as the sequel of an exhausting illness in any animal, repair is less hopeful. In either case we must seek to disinfect the discharges with a simple lotion as boracic acid or chinosol, and stimulate the ragged edges of the ulcer with some active substance, as nitrate of silver or protargol. There are several effective agents for this purpose, such as calomel dusted on, but none better than the argyrol. Solutions of two to ten grains per ounce of distilled water applied by means of a camel hair pencil daily, or at intervals of two or three days, will usually be followed by a healthy appearance of the wound, a disposition to heal, a reduction in the size of the ulcer, and final closure with a

white scar or nebula. In some languid and obstinate ulcers the surgeon will even touch the edges with a solid stick of nitrate of silver, but such practice cannot be recommended to the amateur without previous experience.

SPOTS ON THE EYE OR NEBULÆ, CLOUDS, ALBUGO.

Cloudy spots on the front of the eye erroneously called cataracts have been referred to in connection with ophthalmia and ulceration of the cornea (*see* above.)

Treatment.—If of no very long standing they may be greatly reduced or even removed entirely by exciting the absorbents with lotions of sulphate of zinc, two or three grains to the ounce of distilled water, sulphate of copper in the same proportion, or nitrate of silver or argyrol of about the same strength. These things cause a little redness or mild inflammation and the edges of the cloud are observed to change colour, at first taking a bluish tint and gradually clearing, until there is finally left but a tiny spot, unless indeed a somewhat serious injury was the original cause. The custom of blowing ground glass upon such eyes has been referred to, and is quite unjustifiable, as producing a great deal of unnecessary pain and inflammation; nothing insoluble should be employed, and the weak lotions above named will do all that can be done with safety.

GRAPE ON THE EYE, STAPHYLOMA.

A bluish white tumour bulging from the front of the eye is recognised by the above names. Such "grapes" vary a good deal in size, surface, and hardness. Extremely rare in horses: not infrequent in cattle, and quite common among dogs, as a sequel to distemper. Fancy cats are also subject to have them after distemper.

In some cases it is nothing more than bulging of excessive fluid from the anterior chamber: a state of dropsy, from which the patient may be expected to recover with restoration to good health and normal secretion, if in the interval, no ulcer is formed or outward violence suffered in the animal's comparatively blind movements. Another form of staphyloma is that in which a solid semi-transparent body grows upon the front of the eye, as a veritable tumour. Dogs and cats have these, and this is the variety most often seen in cattle. Sometimes, too, one sees distinct hairs growing upon those of cattle.

Treatment.—A good surgeon may succeed sometimes in paring off the requisite amount without allowing of the escape of the aqueous humour, but we shall generally be wise to content ourselves with the use of caustics. Solid stick nitrate of silver may be applied over the bulk of the grape at intervals, but it will be advisable to first employ cocaine (*see* Ophthalmia). The contraction of the tumour may leave only partial impairment of vision, but we cannot expect perfect restoration or the entire disappearance of the disfigurement. Many cases result in total loss of sight by gradual encroachment upon the rest of the eye.

DISEASES OF THE HUMOURS OF THE EYE.

Injuries resulting in unusually severe inflammation may affect the fluid contained in the interior chamber: escaped blood may be seen in it, or a milky white fluid. Unless these effusions into the chamber are quickly absorbed and carried away, they result in permanent pearly white deposits like that of an oyster where it is attached to the shell. Nothing can be done after the first efforts to allay inflammation, as recommended in

connection with ophthalmia or inflammation of the cornea. It has been thought that iodide of potassium or iodides of mercury and arsenic promote absorption to some extent, and it may be worth trying when the deposits are recent.

GLAUCOMA.

It has been previously pointed out that the vitreous humour occupies the greater part of the globe and all the posterior portion. Changes in the composition of this structure are unfortunately common with advancing years in most animals, but more especially dogs. The Blenheim spaniel, the pug, and others with prominent eyes, are most often noticed and noticeable, but the writer has examined many hundreds of dogs' eyes of all breeds, and considers glaucoma as inseparable from old age.

It may be, as some veterinary surgeons affirm, that treatment in cases of glaucoma accidentally produced by injuries is to be cured by iodides and tonics of the mineral class, but the *vis medicatrix naturæ* is an active ally in the case of the young patient, and we know that all sorts of deposits are occasionally absorbed, whether from eye or brain, muscle or bone. It is very slow and progressive in old dogs, but there is no reason to suppose that it is painful, except in the acute form known to human sufferers.

DISEASES OF THE NERVES OF THE EYE, GLASS EYE, AMAUROSIS.

In all the domestic animals, but especially in the horse and in young bulls, we meet with that peculiar absence of sight in what looks like a sound eye. Glass eye is the old name for it. Its transparency is not impaired. When steadily viewed, it does not respond to light any more than would an eye made of glass, and may have come by the name for either or both reasons. The optic nerve, which enters the eyeball as a round trunk, immediately spreads over the back of it and is the means of conveying impressions to the brain—sight, in a word. Paralysis of this nerve is the cause of so-called glass eye or amaurosis. Many cases have been certainly known to arise from blows and falls upon the head, but not all can be accounted for. We know, of course, that any pressure upon the optic nerves or their deep-seated origin in the brain (optic thalami) may cause it; therefore hæmorrhage (apoplexy) of the brain will obscure the sense of sight as it will other senses. Sudden withdrawal of the blood circulating in the region produces temporary blindness from paralysis of the optic nerves, as everyone knows who has fainted. It seems as if the world grows *dark* to one swooning. Inadequate exercise and too rich food is the cause in young bulls being forced for show.

Amaurosis has been the cause of many law suits. Very few men are able to detect the disease when buying a horse so affected, and breach of warranty is asserted when the discovery is made. The seller is frequently loud in his assurance that the horse is "sound in wind and limb," and the animal's clear eye does not rouse the purchaser's suspicions. It is a hopeless form of unsoundness.

SQUINTING—STRABISMUS.

Animals very rarely squint, and Professor Williams asserts that they never do save as the result of disease. I have certainly seen both dogs and cats which squinted from birth, or from the time when their eyes were sufficiently visible to detect the defect. It is, however, so rare that it commonly points to such diseases as tetanus (lock-jaw), lead poisoning, indigestion, and meningitis.

DISEASES AND MALPOSITION OF THE EYELIDS.

Turning in of the lower lid is an occasional defect met with in animals, especially in dogs of the prominent-eyed varieties. Such malformation brings the lashes upon the sensitive front of the eye, and a chronic inflammation (conjunctivitis) results. Sometimes it can be cured by taking the lashes in a pair of forceps and bending them almost to breaking point, so that they are permanently directed outwards. It may be necessary to nick out a V from the lid, but a veterinary surgeon should do this, with proper appliances and assistance. Forcible removal of the lashes individually is sometimes necessary.

SORE EYELIDS.

By this term I would especially refer to a disease affecting the margins of the lids and frequently met with in dogs and cats but very rarely in horses or cattle. I have not seen it in pigs (or anyone who professes to have done so). Around the edges of the lids are a number of minute glands (Meibomian), whose function is to supply just enough unctuous matter to prevent the tears running over, as long as they are secreted in normal quantity. These glands are subject to inflammation of a chronic type, and with the result of red and swollen edges and habitual overflow of tears. A waxy-looking material accumulates and adheres to the short hairs.

Treatment.—Soften the matter and cleanse the lids with warm water in which a pinch of boracic acid has been dissolved; wipe dry with a very soft material, and anoint with the weak ointment of nitrate of mercury. Repeat on alternate days.

EYELIDS—WARTS AND EXCRESCENCES.

Warts of the flat, broad-based variety are apt to form on the skin outside the lids. Before applying any remedies cover the lower portion with cold cream or vaseline as a protection against caustic agents, which in this situation must be applied with special care to avoid injury to so delicate an organ as the eye. What may be called warts sometimes form on the haw or third eyelid, and by their presence set up chronic inflammation. They should be removed by taking up with a needle and thread and lightly separating with a very sharp knife, taking care not to remove any portion of the haw itself. (*See* Warts.)

WOUNDS OF THE EYELIDS.

Special care should be taken to preserve every atom of a torn eyelid, bringing together, with fine stitches, small ragged portions which at the time of injury seem only fit to be cut away (*see* chapter on Wounds).

OVERFLOW OF TEARS.

As a symptom of disease this has been several times referred to, but it may be due to stricture of or obliterated lachrymal duct. In the inner corner of the eye, under the haw, is a very small drain which passes down the inside of the face, and opens on the floor of the nasal chamber near the part at which the reflection of the skin ends. If you open the nostril of any horse you will see a little hole or opening. A similar tear duct exists in every animal, and if any obstruction occurs the surplus water flows over the face instead of down this channel. Audiences too cultured and self-possessed to be "moved to tears" are to be seen moved to handkerchiefs instead: the explanation will at once occur to the reader: the eyelids are tightly closed and the tears run down the nose instead of over the cheeks. King Charles

spaniels, Blenheims, pugs, bull dogs, and others with snub noses are especially liable to occlusion of the ducts; hence their usually tear-stained faces. If a foreign body is the cause of obstruction of the duct, it can be removed. If through enlargement or deformity of the haw, something may be done (*see* Excrescences on Eyelids, etc.), but in quite the majority of cases the obstruction is beyond remedy.

WORMS IN THE EYE.

A fine worm (*filaria*) has been seen in the aqueous humour of the eye of a few horses brought from India to this country, but it is an extremely rare parasite in temperate climates, although somewhat common in India and other parts of Asia. It is removed by puncture of the anterior chamber, and the operation is usually successful; the wound healing and the chamber refilling simultaneously.

DISLOCATION OF THE EYEBALL.

So serious an accident as the knocking out or tearing out of the eyeball is naturally and at once regarded by the novice in surgery as irreparable. As a matter of fact there is quite a reasonable hope of restoration. With a horse or ox the chief difficulty is one of control. So much time must elapse before it will be possible to get the organ replaced; but in prominent-eyed dogs we may roll them in a coat or rug and make an attempt at once. Because it must be done immediately, the amateur should be able to render this form of first aid. While one person holds the head still, another puts the balls of his thumbs against the eye and forcibly pushes it into the socket. If he cannot get it in, he may slit the outer corner of the lids. Unless the organ has been dislocated some time and much swelling and laceration have taken place, it is nearly always possible to return it. A very little pressure, as that required in holding a dog for tooth extraction, is sometimes enough to make the eye come out. Once in, a bandage of several folds of lint steeped in a soothing antiseptic lotion should be applied, and the animal kept in a quiet, dark place. Many eyes have completely recovered after this very serious accident, but no matter what amount of injury to sight may have been incurred, if the ball itself can be saved, it is desirable, both for the appearance of the animal and the preservation of the other eye. Where extirpation is unavoidable, the remaining organ "sympathises," as it is said, owing, of course, to the crossing of the nerve fibres from one side to the other at the junction from which the optic nerves divide (optic decussation). A blind eye is better than no eye, if it is only an inefficient one, and not chronically inflamed or painful.

EYE BLIGHTS.

At irregular intervals, more often in the autumn, sheep suffer from an infectious inflammation of the front membranes (conjunctiva and cornea), and flock-men describe it as eye blight and tell us that the animals are blind. They are so, just while the opacity lasts, but it almost always clears up, and that quickly. It is important, as soon as one or more cases occur, to separate them from the flock, and first foment with a 10 per cent. boracic acid lotion, and two or three days later a 5 or 7 per cent. protargol or nitrate of silver lotion, to facilitate the clearing up of the lymph effused between the layers of the cornea, which we have described elsewhere as constructed somewhat like the outer layers of an onion. A mild dose of salts and bicarbonate of potash should at the same time be given, and the afflicted ones be favourably placed to find their food.

Chapter VII.

DISEASES OF THE BRAIN AND NERVOUS SYSTEM.

These are not so numerous or frequent among animals as among men, for reasons which will be obvious to all thinking persons. Scientific writers make many distinctions as to functional and organic diseases and those affecting the brain substance or its coverings. We can only afford to glance at the chief nervous diseases, describing their symptoms and the methods of treatment or prevention suggested by experience collated by others.

If there is one prominent symptom which divides diseases of the brain substance from that of its meninges or covering membranes, it is that of coma to a greater or less extent, evinced by drowsiness and varying to insensibility, whereas with diseases of the meninges there is excitability, spasms, or convulsions.

Pressure in or upon the substance of the brain may arise from external causes, as when a cyst to accommodate the middle life of the tapeworm (Tænia cænurus), or tubercular deposits take place. Secondary abscesses from strangles give rise also to brain tumours. Tubercular and actinomycotic deposits show a preference for the coverings, and inflammation of these meninges will develop those rare symptoms of mania which make the larger animals extremely dangerous. The "fear of man which is upon every beast of the field" is our means of control, and when through temporary insanity the horse has no more fear of authority than a drunken man accustomed to be servile when not in his cups, no ordinary methods of constraint will avail.

INFLAMMATION OF THE BRAIN, PHRENITIS.

This state is fortunately very rare. It may be brought on by morbid growths due to previous injury to the brain or its membranes, or be due to a specific cause as in rabies. The animal's behaviour, no matter to what species it belongs, is much the same. The writer has seen the gentlest of kine charging stable walls, and seizing woodwork with the mouth, and horses levelling every structure but the walls. They will bite themselves or any object within reach, animate or inanimate. Blind apparently, they will attempt to scale the walls of the building in which they are confined, fall over backwards, and while prone imitate with their legs the spokes of a wheel rotating. The eyes meanwhile "in a fine frenzy rolling" or staring and bloodshot; the mouth open and frothing, and at intervals giving to vent peculiar sounds such as are never made by healthy animals.

Treatment.—It is doubtful if treatment ever succeeded when this malady was fully developed, but if it is attempted it should be on the lines of bleeding from the jugular veins to relieve blood pressure in the head, or from any vessel which can be reached with safety, allowing blood to flow until sighs indicate approaching fainting. Brain sedatives, as choral and bromides of potassium, Indian hemp and morphia, may be tried as draughts or subcutaneous injections.

Congestion of the brain falling far short of the condition previously described has come under the writers' notice both in horses and cattle. They appeared to suffer from hallucinations and would tremble, snort, and run back from the manger or some other familiar object, and in short show all the horror of a man who "sees snakes" after an alcoholic debauch.

Treatment.—These cases have immediately yielded to bleeding from the jugulars, and followed by a bold purgative have remained well afterwards.

SIMULATED MADNESS.

The temporary insanity of cows and some other animals as a result of milk troubles or chills after giving birth to young will be found under the head of Eclampsia.

BRAIN TUMOURS.

The origin of these is obscure and they are not very frequent, although by no means rare. During the early days of their formation a heaviness or languor is noticed, some of the torpor or sleepiness previously referred to, followed by accommodation and apparent recovery; then further periods of depression, and lastly dementia. The animal wanders aimlessly round the box, always in the same direction, sometimes bringing his head in contact with projections or moving straight up to and against the wall, or backing against solid objects. The symptoms continue with more or less similarity to those above described in connection with phrenitis, but seldom so acute, the patient more often sinking to the ground and expiring quietly than making a mad rush and falling to rise no more. Horses with any brain trouble should be submitted to the examination of a veterinary surgeon, and his advice acted upon without delay. They are extremely dangerous if taken in a fit while in harness. Most people send them to auction sales, without warranty, and the buyer congratulates himself on having acquired a great bargain, until the malady again shows itself, when he passes the animal on, and so it happens that the horse continues to be a danger both to his driver and to the public. Such creatures ought to be destroyed.

WATER ON THE BRAIN, HYDROCEPHALUS.

The young of all species are liable to this congenital trouble, but among the domesticated animals foals and calves are perhaps most subject, while it is by no means rare in the lambing pen. The forehead is bulged with fluid, and gives the youngster a most unlovely appearance. They should not be rashly destroyed, as in quite the majority of cases the fluid is gradually absorbed, and only what is known to horsemen as a "bumpy" forehead remains to testify to this youthful misfortune. Mares with bumpy foreheads should not be bred from, as it is a distinctly hereditary defect.

Treatment is sometimes advised in the way of small doses of iodide of potassium and iron salts.

Cysts, hydatids, or water bladders in or upon the brain are common to sheep, and their nature and cause are described in connection with tapeworm. Some shepherds take the risk of breaking the bladders by running a probe or wire up the nostrils, and veterinary surgeons trephine the skull where the value of the animal justifies such an expenditure, but most sheep-owners will deem it to their interest to get off giddy sheep to the butcher as soon as possible.

Prevention consists in regular dosing of sheep dogs and others with anthelmintics calculated to kill and expel tapeworms.

APOPLEXY.

Apoplexy is sometimes spoken of as congestion of the brain, but is here intended to mean rupture of blood-vessels. Upon the extent of the lesion and quantity of blood, the part of the brain affected, and the amount of pressure, will depend the degree of paralysis and what parts are affected. True apoplexy is nearly always hopeless, as the length of time during which trial would have to be made is so long as to run off the value of the animal. Some few cases in pet dogs have recovered. Parturient apoplexy, so called, is now known to be due to some toxic substance developed during lactation, and the name is no longer descriptive of the true condition (*see* Milk Fever).

HYSTERIA.

Under this term we may consider the peculiar behaviour of heifers, and sometimes cows and mares, when suffering marked excitement in connection with the periods of œstrum.

Symptoms.—Muscular spasm of certain muscles which pull the head upwards and backwards, a watchful expression of the eyes, dilation of the nostrils and extreme sensibility to the touch, so much so as to simulate tetanus (which see). Heifers will sometimes fall into convulsions, champ and foam at the mouth, bellow loudly, and in the intervals grind the teeth. Mares show somewhat similar symptoms, but more often given vent to their feelings by kicking and biting.

Treatment.—If the gratification of the sexual appetite is not convenient to the owner, bleeding should be resorted to, and a dose of aperient medicine together with a full dose of chloral, of bromide of ammonium, or potassium, or extract of belladonna. As a remedy for immediate application, a bucketfull of cold water well aimed at the head can be recommended. If no harm happens to the subject of hysteria by its own violence, it will usually calm down in a few hours, when maturation of the ova has been completed.

EPILEPSY, CATALEPSY, FITS.

The pig, dog, and cat are most subject to fits of the epileptic type, the larger animals rarely suffering from true epilepsy. It is a nervous disorder which in many subjects is never traced to its cause. We infer, however, that fits are often due to reflex action, or the irritation to nerve ends or branches, because removal of such irritation as is produced by worms and acute indigestion from unsuitable foods is followed by recovery, complete and permanent, or until the like causes are again brought to bear. We have no means of ascertaining from the lower animals if they have any premonition of fits, and we know that such warning is by no means constant in human subjects. We see only that their invasion is sudden. Trembling, loss of control over the voluntary muscles, falling to the ground, violent contortions, spasmodic twitchings, rolling of the eyes, clenching of the teeth; froth and mucus escaping from the mouth or hanging in ropes, stormy action of the heart which may not infrequently be heard at a distance, and involuntary escape of urine and fæces. These are among the chief symptoms, and they are usually followed by a heavy sleep, from which the patient awakes with very little the matter, if he has not collided against something while insensible, or bitten his tongue.

During the teething period both pigs and puppies, kittens, and other animals are liable to fits, and they are called teething fits from the observed association, but they are of the type above described. Worms, at any age, but especially in early life, are a frequent source of fits. Food too stimulating and not easy of digestion is a common cause of fits in pigs, and maize meal improperly cooked is responsible perhaps more than any other food stuff.

There are three rusts to which maize is subject, and these parasites are the cause of inflammation of the stomach and bowels, and affect the brain and spinal cord, as well as kidneys and bladder. Their action in the digestive canal liberates a poison which specially affects the nerve elements. Some individuals are more resistant than others, and the cause is therefore constantly overlooked, the unfortunate owner not suspecting the food when a number of other animals fed upon the same are not apparently affected. When fits or partial paralysis occurs in any species of animal, the food question should be seriously considered. Evidence is accumulating against certain Burmah beans, and so-called Indian peas (Lathyrus sativus) have long been known to produce brain and spinal cord derangements resulting in fits or paralysis.

The rusts and moulds that spoil the sale of cereals to the horse keeper and the stock feeder lead to the distribution of damaged stuff in other ways. The vendors of cheap and nasty cakes and mixed meals for cattle, pigs, and poultry avail themselves of such low-priced substances, and make attractive smelling compounds "nosed" up with fenugreek and aniseeds and mixed with salt (*See* Diseases of Poultry.)

Treatment.—Cold water poured on the head will often prove beneficial, and in puppies a warm bath may be tried. Chloroform inhaled quickly reduces the violence of the spasms, but should be employed with care. During the fit, gag the animal with a large cork or piece of wood to prevent it biting its tongue. Avoid constipation and irregular living, both as to food and exercise or work. Extraction of retained temporary teeth or portions which irritate the gums. Removal of worms from the stomach and bowels (*see* Worms).

PUERPERAL ECLAMPSIA.

(*See* Milk Fever and Eclampsia.)

SUNSTROKE, HEAT STROKE, HEAT APOPLEXY, HEAT EXHAUSTION.

Sudden prostration, followed by insensibility, and frequently fatal. The popular idea among those who have not seen cases of heat stroke is to attribute it to the direct rays of the sun, and to provide against these by adding one more annoyance to the harness horse, and dressing him in an old woman's bonnet. Let me say, as one having special experience of this malady that I have seen many *more cases of it in horses on board ship and in the 'tween decks, where no sun could shine on them, than in the broiling heat of Natal and other hot countries.* The sun-bonnet, the first sample of which I happened to see in the offices of the R.S.P.C.A., was introduced to a sentimental public in this comparatively sunless country, and should give place to smoked goggles, when a change of fashion seems desirable.

Symptoms.—These differ somewhat, and the varieties have been divided by scientific writers. The chief symptom is prostration, more or less sudden, hanging the head with half-closed eyes, rapid shallow breathing with dilated nostrils, presently sinking to the ground in a state of coma. Death is due to failure of the heart.

Treatment.—Cold water over the head and down the course of the spine, from a powerful hose, if possible. This plan is adopted with much success in the hot belt of American cities, where horses falling in the streets are placed upon a trolley and run to the ambulance stations in a marvellously short space of time. I have found it most successful on board ship, so long as cold water from the sea could be got, but in the tropics, when most needed, the temperature of the water is often above 85° of Fahrenheit. Heart stimulants, as draughts of aromatic spirits of ammonia, one to two ounces in a pint of water, or carbonate of ammonia two to four drachms, also help to save that organ from paralysis, and keep the pump going. Alcoholic stimulants may be used, and friction to the surface, when the animal begins to show signs of returning consciousness. It is not desirable to get a horse up too soon; he will recover better if left on the ground, but should be watched lest he should again lapse into an unconscious condition. This need not be fatal, for I have landed a horse in Durban that had three times been apparently dead from heat stroke. When the symptoms have all passed the animal feeds and behaves as if nothing had been the matter, in the great majority of cases, but one sees some imperfections of action follow which become permanent—in a few instances amounting to paralysis.

LOUPING-ILL, TREMBLING, SHEEP STAGGERS.

These names have been given to a disease which the researches of Professor Hamilton, Principal McCall, and others have proved to be due to a specific bacillus, the Braxy bacillus (*see* Braxy), and the varying symptoms formerly led to the belief that several diseases were concerned. They are but different manifestations of the same malady. The term thorter-ill is sometimes used where quarter ill or black leg (symptomatic anthrax) is meant. Sheep are subject to this as well as the genuine anthrax to which it is allied, but not caused by the same specific organism. (*See* Black Leg or Quarter Ill.)

CHOREA, ST. VITUS'S DANCE, SHIVERING, STRINGHALT.

Chorea, as a sequel to distemper in dogs, will be found under the heading of Distemper. In horses, these irregular involuntary movements of the muscles are better known as shivering, and they appear to follow on some trouble of colthood which does not manifest itself like distemper in dogs, but will probably be found to have a similar relation.

Symptoms.—The tail is jerked up when the animal is suddenly called upon to move; the chief muscles of the thighs and quarters undergo a spasmodic rigidity; and backing is a great difficulty. Some horses only show the disease when keeping back a load on an incline. It is a very serious form of unsoundness, and invariably gets worse, if not rapidly, then by slow degrees, and is sometimes worse than at others.

There is no treatment known to be of any service.

STRINGHALT.

This is another of the obscure nervous affections confined to equines. Some of the muscles of the hind limb act an exaggerated part, lifting the foot of the affected limb unnecessarily high. One or both limbs may be involved, and the trouble generally grows worse -slowly in slow horses, or those very moderately used, and often rapidly in hunters and others put to the best of their paces. It is always worst on starting in the morning, and improves with work, and horses turned out to grass benefit while so situated. It does not appear to be associated with any pain, and animals afflicted with it may do a good deal of service, until the action is so extravagant that the feet actually strike the belly.

Much ink has been spilled in theorising as to the causation of stringhalt, but nothing is really known about it.

LOCK-JAW, TETANUS (*See* page 26).

MEGRIMS, STAGGERS.

There is considerable likeness between megrims, staggers, and epilepsy (*see* Epilepsy), and the old-fashioned divisions set up before veterinary works became too technical for the lay reader are useful for our present purpose.

MEGRIMS.

It would seem that megrims is due to blood pressure in the brain, by which the senses are disordered, since restoration is rapid if blood is taken from the veins coming from the head. It is not like the fit of epilepsy, or the heat stroke, for in the former spasmodic violence is usual, and in the latter, the opposite condition or one of coma but in the majority of cases megrims may be described as an attack of giddiness, and twitching of the muscles of the head and neck in an involuntary manner. That the pressure affects the origin of the optic nerves is evident from their behaviour. Sensibility is comparatively lost, and the muscles controlling the eyeballs, being in a state of spasm, cause them to roll. There is fullness of blood evidenced in the

bloodshot eye. The breathing is quickened, and the animal may stagger and fall down, but more frequently leans to one side and recalls itself by an effort from falling. With an ordinary collar, a horse may be subject to megrims; with a piped collar, rarely or not at all; and with a breast collar, confirmed subjects have been known to work for years, free from fits. All these circumstances point to some determination of blood to the head, or obstruction to its return, which would have the same effect.

Treatment.—To know the cause is to be shown the remedy. Keep the neck free from pressure by using a breast collar, or if that is impracticable have a deeply piped collar. This will not cure a horse that has fits when ridden, but these are comparatively rare. Keep the bowels always on the soft side, by regular mashings, by linseed or green meat, and by occasional aperient medicines. A known subject of megrims may with safety be given a physic ball three or four times a year, provided a day's setting is allowed (*see* Physic). The disease constitutes unsoundness, and makes a horse returnable if sold as sound. Some of them prove a perennial source of income to auctioneers, as each unfortunate owner after another sends his animal to auction "with all faults and errors of description."

PARALYSIS.

Paralysis or loss of power over the voluntary muscles may affect one half of the body, or one side of it, or a limb, or merely some portion of a member. It is an effect, not a disease in itself. An animal that is stunned by a blow may be wholly paralysed for the time. A cow, self-poisoned by the toxin producing milk fever, will be helpless, because the brain is supplied with impure blood and fails to exercise its functions and direct the body. An injury to the spine which so compresses the cord as to interrupt nerve current will produce paralysis behind the seat of pressure, so that a broken-backed horse may retain appetite and sense, yet be quite unable to move a hind foot or feel a pin prick in the limb below. Pressure in or upon large trunks of blood-vessels produces a cramp or paralysis, permanent or temporary, according to the nature of the obstruction or pressure. A clot of blood blocking a large vessel going to supply a limb will perhaps cause paralysis for months, while undergoing certain changes which end in its reduction or removal, when restoration more or less complete will follow. Cows and sows are prone to temporary paralysis from the pressure of the gravid uterus upon the greater trunks of nerves and of blood-vessels which, at other times, find plenty of room for the due exercise of their office. A sudden movement of the fœtus, or a purgative which relieves the pressure, will in such cases appear very wonderful by those who have not considered the cause.

From the foregoing remarks it will be seen that paralysis is a term of wide application and a malady requiring very various treatment. It will be found in different parts of this work in connection with particular diseases, and suitable treatment suggested (*see* Paralysis of the Lips, Chapter on Diseases of the Digestive Organs, Milk Fever, Specific Diseases, &c., &c.)

Chapter VIII.

DISEASES OF THE GENERATIVE ORGANS.

Diseases of the organs of reproduction are not numerous in animals, if we except such as result from parturition in the female, and these are to be regarded rather as accidental or dependent on some abnormal circumstance or condition under which the creature has brought forth.

BULL BURNT, GONORRHŒA, CLAP, BALANITIS.

Horses and cattle are liable to a disease communicated during coition and known by the above names. In this country it seldom takes a very serious form, but in parts of Europe and America a very malignant variety occurs under the name of *maladie du coit*. Occasionally a stallion suffers from an irritating discharge either from the urethral canal or the prepuce. Bulls suffer most on the outside of the yard and within the sheath, not so much in the lining membrane or the urethral canal. The malady is communicated to mares and cows, inducing a scalding inflamed membrane, which discharges a thick mucus and excoriates the skin around. Vesicles form in connection with some of these attacks in situations (above) where it cannot be supposed that actual contact of the virus was the prime cause. When these are noticed there is more or less constitutional disturbance and evidence of fever.

Treatment.—Enough has been said to show the importance of stopping all service; indeed, actions for damage will lie, if infected stud animals are knowingly let. The infected animal should receive a cooling dose of medicine, preferably salines, as salts, and bicarbonate of potash. For a stallion, a two-ounce dose of bicarbonate of potash with half a pound or more of salts, and for a bull, the same amount of potash and about twice the quantity of salts (sulphate of magnesia). The prepuce should be cleaned out with warm water and soap, and afterwards injected with a 4 per cent. solution of chinosol, 1 per cent. lysol, or creolin, 4 per cent. sulphate of zinc, eusol, or other astringent of the disinfectant variety (*see* Disinfectants and Antiseptics), and this may have to be repeated daily for some time. The diet must be cooling, and all traces of the disease have disappeared before being allowed to serve again.

INFLAMMATION OF THE TESTICLES. ORCHITIS.

Stallions and dogs are more liable to this painful malady than animals of other species, but none is wholly exempt. It is not difficult to imagine circumstances in which an accident may occur, and severe kicks or blows result in acute inflammation. Arabs and other horses which are ridden as entires of course run greater risks than others. Dogs employed in sport meet with similar injuries, but the idle and luxurious, and those never having intercourse with the other sex, are apt to contract a form of chronic orchitis.

Treatment.—Warm anodyne fomentations may be applied to horses, as an ounce of Goulard's extract, an ounce of laudanum, an ounce of glycerine, and a quart of water, at little over blood heat. The scrotum may be suspended in a soft bag, made for the purpose, and fastened over the loins by means of broad webbing. In this way poultices may be applied also. A cooling aperient should be given (*see* Physicking), and laxative diet, with rest and freedom from all excitement until restoration is complete.

INFLAMMATION OF THE SCROTUM OR PURSE.

Inflamed skin in this region is the result of violence or of contact with snow or wet grass. It is not rare in dogs. Warm fomentations for horses (*see* Orchitis above), and for dogs a lotion of glycerine and water one in eight; no lead or other poisonous lotion must be used, as the dog is sure to lick it if at liberty. A muzzle should be employed in this and many other cases, where it is necessary to prevent dogs from getting at wounds or tearing off splints. The provision of a soft rug should not be forgotten, as the sharp ends of straw and some other sorts of bedding leave the patient no chance of comfort. Although this state of affairs presents a very painful swelling, and the skin is hot, tense, and shining, it usually yields to good treatment in a few days.

DROPSY OF THE SCROTUM OR PURSE. HYDROCELE.

Animals are liable to hydrocele in advanced years, but it is seldom of any serious consequence. With stallions their work is usually done before it occurs. If it is desirable to retain the services of one with a dropsical scrotum, the fluid may be drawn off by puncture with a fine trochar and canula. This is not a very serious operation, and, provided it is done with antiseptic precautions, it is quite successful for a time, the fluid gradually accumulating again. Cases have occurred where castration could not be performed, owing to hernia, and injections of iodine preparations have been resorted to with some measure of success. (The fluid is not produced by the testes, but from the serous membrane covering them and lining the sac.) Under the ordinary circumstances, castration is the effectual remedy both in horses and dogs (*see* Castration).

DROPSICAL SHEATH, SWELLED SHEATH.

Geldings are liable to swollen sheath, which causes them considerable discomfort, and may even hinder the act of micturition so necessary for a horse's comfort.

There are a variety of causes for this trouble, chief among them being the accumulation of sebaceous matter destined in the entire animal to lubricate the passage of the yard under circumstances not required of the emasculated animal. This secretion should be of a consistence equal to cold cream or pomade, but, like all others for which there is little or no use, modifications of the secretory glands follows. The substance is not of the nature and quality demanded of the stallion; it is unduly dry and hard and sticky, and in this condition is known to stablemen as cod wax, and to unprincipled dealers in screws as a soft cement for concealing sand cracks and other defects of hoofs. An accumulation of this perverted material exerts a pressure which impedes circulation and gives rise to swelling.

Apart from accumulations of the kind referred to above, the sheath is liable to dropsical swellings, in common with the legs. Anything which gives rise to debility may lead to swelled sheath. Hence we find it following on all sorts of illness, and as the result of old age and poverty, as a sequel to castration, or any injury to the parts adjacent.

Treatment.—This will be local or constitutional, or both, according to the cause. In the form first described, it is easily enough cured by cleaning out the sheath with warm water and soft soap, and introducing an abundance of lard, besides greasing the outside liberally. It is not a very nice job, and, as one who has often done it, I can say that the work is easier if a good portion of lard is introduced an hour or two before the soap-and-water process, and then the yard is more easily withdrawn and cleaned. If debility is the cause, tonics with diuretics will be required, as drachm doses of iron, gentian, and nitrate of potash daily. If the swelling is hard and painful it may be necessary to scarify—that is, to make some lancet pricks, and let out some of the serum. Exercise is indispensable to a cure.

BLEEDING AFTER SERVICE, OVER-BULLED.

Serious injuries are sometimes incurred when over-vigorous male animals, disproportioned in size, are allowed to serve females imperfectly developed or abnormally short in the vagina.

Treatment.—Consists in syringing with a weak antiseptic lotion containing an emollient, as boracic acid ten grains, glycerine one ounce, water twenty ounces. A saline aperient may be given (*see* Physic), and perfect rest and freedom from excitement.

In some cases a great deal of subsequent suffering is endured and the animal is seriously ill: arching the back and frequently straining, failing of appetite and going back in condition rapidly. It is then desirable to inject a drachm or two of extract of belladonna, rubbed down with an ounce of glycerine and a quart of warm water: repeating this night and morning until the more urgent symptoms are relieved. A dram of the belladonna extract with a dram of chloral may also be given as a draught at night.

BARRENNESS AND STERILITY.

There are many causes of failure in the breeding of animals: some of them obscure, and others remediable to a greater or less extent. A few are here set forth.

First, the health of the intended parents. If the mare is not sound, it should be quite certainly ascertained that the defect is due to accident and not to heredity. Her bodily proportions, or "roominess," should be taken into account, many disappointments following on a disregard of proportions. You cannot expect a slab-sided, narrow-gutted, three-cornered mare either to carry or bring to birth a good foal, and if she drops a living one it is only to be expected that it will inherit her defects.

The teats and gland substance should be examined. Let me, for example, quote a fine mare that was put to horse, judged only by her points, and it was afterwards discovered that she had been injured in the udder in such a way

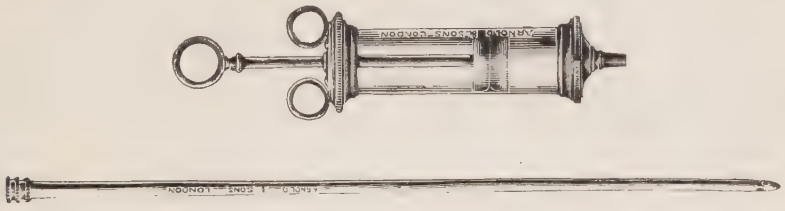


FIG. 16.—ARTIFICIAL INSEMINATOR.

that one teat was blind, and the other quarter seamed across by a scar that went right through the gland substance. It was practically impossible for this mare to suckle a foal. What happened was an inflamed bag, and foal killed by the dam while attempting to suck.

The outward genitals should be observed carefully. Any signs of dried mucus around the lips of the vagina, any loss of pigment or discoloration, or signs of scalding below the shape, and not clearly due to scour (which shows wider on the thighs and not immediately under the labiæ), or skin on underside of tail looking chapped or rough, should make one suspicious of a previous gonorrhœal discharge, or whites, or of habitual acidity of the vaginal mucus, either of which will hinder conception. These matters will, of course, need more scrutiny when, as often happens, a farmer buys a good-looking mare that has broken down on the streets, and has no hereditary unsoundness, but they may be easily overlooked in mares kept on the holding. While not approving of too much manual interference by rough hands unprepared by a suitable antiseptic, we have seen disappointment follow for want of a simple examination, as when a polypus or morbid growth has been present and given no greater evidence than that of slightly blood-stained mucus, drying quickly on the edges of the shape, and not rarely seen in old hard-worked mares. A hand prepared by carbolised oil will ascertain if the passage is clear and the neck not constricted, a most important point to observe, as from trouble at a previous birth this may be so narrowed that fecundation by the male cannot

take place. The insertion of a finger and distension by a second or third finger just prior to service may be reasonably supposed to have secured impregnation in a good many cases. I am a convert to this notion myself, for I thought for many years that the minute spermatozoa could find their way through an orifice as big to them as a barn door is to us, and no doubt they would, if sufficiently strong and deposited in perfectly healthy surroundings. But they often are not strong; the horse has been exerting himself too much, or the vaginal mucus is acid. It follows, then, that the more virile seminal fluid that is conveyed direct to the region where most healthy ova are likely to be found, the greater the prospects of conception.

The successful employment of the inseminator is indirect evidence in favour of this contention, for with this instrument we pass over a possibly infectious field where but slight acidity will, we know, debilitate the germs, which may weaken and die and never reach their destination, or, doing so, fail of their wonderful purpose in the animal economy. An ounce or two of bicarbonate of potash in the drinking water for a week has the effect of making neutral the mucus of the canals of both male and female, and should be given in doubtful cases, as in none can it do harm. An injection, some twenty to thirty minutes previous to service, of one ounce of the drug in twenty to thirty of warm water, has often proved valuable, but it has sometimes failed because the user pours boiling or very hot water over the bicarbonate, and this changes its composition.

FIG. 17.—ARTIFICIAL INSEMINATOR.

The desire to breed and the capacity to do so should result from perfect health, producing exalted function, and this is best brought about by good hygiene, or such healthful conditions as to feeding, housing, and exercise as are known to promote general vigour. It will seem to our more advanced readers quite unnecessary to say this, but they may not know that thousands of owners of mares, and not a few proprietors of sires of low value, are always seeking for a conception powder, or a *mistura mirabilis*, which shall confer fecundity on a badly kept animal. High sexual appetite and fecundity must be sought in continuous good management, not in spasmodic efforts a few weeks before the breeding season commences. With good management we should not often need drugs or artificial aids to conception; yet, as indicated in the previous part of this article, there are some matters we can control or dormant functions to be woke up. A full supply of blood to the ovaria of the filly, or to the testes of the young horse, cannot be expected if they have been debilitated by the presence of those little red worms (strongyles). The animals may have won the battle against them, but are weakened, and much help may be given by supplying the elements wanting, such as iron and phosphorus—the former in the shape of carbonate or sulphate, with a bitter vegetable tonic, as cinchona bark, or gentian root. Nux vomica, from which strychnine is derived, has long been recognised as a valuable tonic to the jaded stallion, but should be reserved for the latter part of the season as a rule; not resorted to in a hurry to take the place of steady preparation.

APHRODISIACS : ARTIFICIAL STIMULUS TO BREEDING.

Students approaching the subject of medicine, and who have not received a classical education, are apt to be annoyed with the scientific terms or terminological exactitudes beloved of many writers, who seem to attach undue importance to classification and descriptive nomenclature. The writer holds no brief for pedants, but recommends beginners to refer to good dictionaries, when they will often be more than satisfied. The above title is a case in point.* We have here nothing more to do with its human aspect than to point to its derivation. Professor Axe and others of scientific attainments, and long practical experience of animals under domestication, have called attention to the fact that refinement of the breeds seems ever leading us to greater difficulty in propagating them. Anxious breeders repeatedly write to us complaining that their pedigree heifers have no instinctive desire for reproduction, and their carefully reared bulls show a complete indifference to the object for which they have been kept. Aphrodisiacs are remedies reputed to produce the desired appetite.

Sexual appetite should be the crown of health, denoting a physiological vigour greater than the needs of the individual's body. The secreting glands of the male and the ovaria of the female depend for their functional activity upon a supply of pure rich blood from which to select the elements of which they are composed and the products it is their special office to prepare. Poverty, then, necessarily militates against reproduction. Over-indulgence in rich food and absence of exercise has a still worse effect upon creatures not stimulated by imagination. It would seem to be the extremely artificial circumstances under which animals are reared that more than anything else leads to abeyance of sexual desire. The reproductive organs are chiefly innervated or supplied with power from the sacral portion of the spinal cord —that part of it enclosed in the irregular bone at the end of the spine where the cord divides into branches and passes out through holes. The ancients deemed this bone sacred, and anatomists call it the sacrum, but whether its worshippers knew its relation to our present subject is not known. In the subjects of sexual inappetence the sacral portion of the spinal cord is functionally ineffective ; it fails to communicate to the organs the stimulus required for the proper performance of their office. " Why should this portion of the spinal cord be affected by domestication and type breeding ? " the reader may ask. One can only give a very indirect answer by pointing to the other changes which have come at man's will when he has bred from high-steppers, flat-racers, and other peculiarities in animals, which, of course, come from cerebro-spinal tendencies transmitted by selection, not by conscious cerebration on the part of an animal. We develop the intelligence of the toy dog, the scent of the hound, the action of the horse, and the milking qualities of the cow, and we are driving forces we do not understand. If we drive them too fast, or infringe laws of nature which we but dimly comprehend, we incur penalties.

Treatment of impotence in the male, and absence of sexual function in the female, will depend, therefore, upon the cause. The poverty-stricken must be brought up to a standard of vigour by good food, perhaps by digestive aids and tonics, providing iron in an easily assimilable form, and giving spinal stimulants in the shape of nux vomica or its alkaloid strychnine. A fat and pampered animal may need just the opposite management—bleeding, purging, exercise out of doors. The generally accepted belief in the greater fertility of the working stallion is founded on fact.

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*Aphrodite : Greek goddess of *love*.

When we have eliminated the above causes there remain many animals of both sexes which fail to breed, and for which an aphrodisiac, at once safe and effectual, would be a great acquisition. Experiments now extending over some years go far to prove that such a drug has been brought to notice by German scientists who investigated the properties of yohimbehe bark, of which the natives of the Cameroons make a decoction for their own use. The active alkaloid (to the annoyance of our new student) is called yohimbine, or corymbine, or corynine, and is represented by a formula we need not state, since experts differ. The drug has, however, found a place in the British Pharmaceutical Codex, which gives it the imprimatur of the medical profession. A convenient preparation of yohimbine is known as aphrodine. We do not commend to readers every new German synthetical compound which has a vogue and is soon pushed aside by something else, but we think that this alkaloid derived from bark is worth trial.

We have read a great many accounts in German, French, and Italian, and, with that "insular prejudice" of which our neighbours complain, waited for confirmation at the hands of Britishers. In one of these the printer has made a curious "bull," as he makes the author speak of complete success following on the use of aphrodine given to a "steer." We may let that pass (as the boy said of the mad dog), and take a serious view of the experiments. Cramer and Marshall gave yohimbine to bitches that did not come into œstrum, with the object of proving whether the heat could be controlled. It had already been shown that horses, cattle, and other animals had come to use and been impregnated, but whether this was a coincidence—a series of such coincidences is not credible—or due to the drug, could best be proved by giving it, withdrawing it, and having recourse to it again. While the drug was given, bitches and rabbits showed all the familiar signs of being at œstrum; when withheld, the external congestion of the organs disappeared. Rabbits were killed, and the internal sexual organs carefully examined, "the whole of the genital tract showing a hyperæmic condition."

Microscopic examination of sections still further demonstrated the engorgement, and that growth had taken place in the uterine mucosa. The uterine effect of yohimbine appears to be due primarily to the effect on the spinal cord, and secondarily by the increased blood supply in continuous stream to the ovaria, the latter being governed by the former. The same thing applies to the male. Cantharides and other drugs acting on this (sacral) part of the cord have the serious disadvantage of affecting other parts and organs detrimentally. Yohimbine may prove a valuable addition to our *materia medica*, but would constitute an ultimate source of injury if relied upon as a substitute for intelligent management and good hygiene.

ABORTION, PICKING, WARPING, SLIPPING, SLINKING, MISCARRIAGE.

The fruits of conception are frequently lost, and at varying periods of gestation. All animals, wild or domesticated, are liable to this accident, but among the servants of man the improved breeds of cows are the most prone.

Sporadic or accidental abortion affecting single individuals is to be expected in every herd, and from a variety of causes.

The more artificial the conditions under which animals live, the greater the frequency of abortion. Professor Axe, in a valuable pamphlet on the subject, says: "In the vast herds of cattle spread over the prairies of America and the mountains and moors of Scotland and Wales, where from birth to maturity the laws of nature are undisturbed by the influence of art, this disorder is seldom experienced. Moreover, its accidental occurrence in one animal is

seldom followed by the disastrous spreading consequences so common in our more refined herds. When considered in reference to the causation of abortion these facts are of the highest importance in directing inquiry, nor can it be overlooked that this tendency is to challenge the artificial refinements of breeding, feeding, and general management under domestication. In this connection, the observations of human obstetricians are quite in accord with those of enlightened veterinarians." Dr. Ramsbotham, in writing on this subject, says: "Abortion is more frequently observed among the higher classes, in those who lead a luxurious life, than among the hard-working population."

In developing milkers, we have no doubt brought upon ourselves an increased liability to disorders, notably the one under discussion, and that fatal malady known as milk fever.

In the slow process of evolution we shall no doubt get rid of these tendencies, but it will probably be after the highest possible development of the udder and the earliest maturity have been reached. The unfit are being weeded out by death, or such repeated losses as make men unwilling to take the risk of breeding again from animals so predisposed to these affections. That any sudden fright or continued excitement will be liable to induce abortion is a matter of observation of great antiquity. It is also beyond contradiction that the more highly organised, and therefore nervous, an animal, the more risk of abortion from the before-mentioned causes.

External violence as falls and blows, fighting with other animals, bad smells, and the sight of blood, are among the causes inducing abortion in animals.

This subject is well summed up by Professor H. G. Bowes, F.R.C.V.S., and published by the University of Leeds, as follows:

CONTAGIOUS ABORTION IN COWS.

Abortion may be due to several causes, but it cannot be too strongly emphasised that the form of abortion which occasions the greatest loss is Contagious Abortion. This form, as the name implies, is due to an organism known as the Bacillus of Contagious Abortion.

In *any* case of abortion the safest course is to regard it as one of contagious abortion and immediate steps should, therefore, be taken to prevent infection of other in-calf cows.

Sources of Infection.—The chief sources of infection are the aborted calf, its membranes, and the discharges from the womb of the aborted cow. Other in-calf cows may become infected either by the food having become contaminated with such infective material or, more directly, by infection through the genital passages. The latter form of infection may occur from the soiling of the cows' hinder parts by infected litter, or it may be directly introduced through the agency of the bull, infection being carried by him from a recently aborted cow to a healthy one.

The steps to be taken for stamping out this disease must, therefore, be directed to the *complete destruction* of all infected material, and the prevention of healthy animals being infected either by contaminated food or through direct or indirect contact with an infected animal. In dealing with this disease it is well to remember that one attack confers a certain degree of immunity to a second attack, and that a cow which has aborted is not (contrary to popular opinion) so likely to abort a second time. It is, therefore, unwise for a breeder to dispose of a cow simply because she has aborted.

MEASURES TO BE TAKEN TO PREVENT THE SPREAD OF CONTAGIOUS ABORTION.

1. *The Aborted Cow.*—The aborted cow must be immediately isolated, preferably put into a loose box away from other cows. The fœtus (dead calf), membranes (cleansing), and all soiled litter should be burned; if this is not practicable they should be buried deeply, covered with quicklime. On no account should they be thrown on the manure heap or buried there. The stall in which the cow aborted and adjoining stalls should be thoroughly cleaned and disinfected. For the latter purpose one pound of copper sulphate (bluestone) to five gallons of water makes an efficient disinfectant. If the cow aborted out at grass the ground where, the fœtus was found should be disinfected by watering with the above solution, or with any other reliable disinfectant. The cow's uterus should be immediately washed out with a disinfectant, such as a solution of carbolic acid, in the proportion of two tablespoonfuls (one ounce) to one quart of warm water, or with corrosive sublimate solution 1 in 2,000; for this purpose an ordinary rubber enema syringe, which may be purchased at any chemist's shop, will be quite satisfactory.

This disinfection of the uterus of the aborted cow should be continued twice a day for a week, and then once a day as long as there are any discharges. The hinder parts of the cow should be washed down with the same solution at the same time.

The aborted cow must not be served at her first season after abortion. She should, on the other hand, be washed out with disinfectant solution, and may be served when she next comes in season.

2. *The Bull.*—Until further evidence to the contrary is forthcoming, the bull should be regarded as a possible carrier of the disease, and the sheath should be washed out with the disinfectant solution immediately after every service. This is done by means of the enema syringe, the sheath being held round the nozzle of the syringe, and by manipulation the penis can be thoroughly disinfected in the sheath. If the bull has been accustomed to this before he is used in the herd, little difficulty will be experienced later. Quiet handling is essential, and in the training period clean water may be used instead of the disinfectant solution.

The bull should not be disinfected immediately before service.

3. *In-Contact Cows.*—Cows which may have been in contact with an aborted cow should have their hinder parts disinfected every day, either by sponging or spraying with the disinfectant solution.

4. *Suspicious Cows.*—Cows which repeatedly fail to hold to the bull should be regarded with suspicion as being, possibly, cases of early abortion. In such cases when they next come in season they should not be served but should be disinfected. When this is done care should be taken that the disinfectant solution is introduced right into the womb by inserting the nozzle of the syringe through the mouth of the womb. To do this the hand should be well lubricated with carbolised oil (one ounce carbolic acid to one pint linseed or rape oil) and introduced into the vagina or passage. The small opening into the womb can then be felt at the forward end of the vagina and the nozzle passed through it, the solution being then injected directly into the womb. This should be repeated every day for one week. The cow may then be served when she next comes in season.

RECENT INVESTIGATIONS.

Recent investigations have been carried out with a view to finding some definite means of diagnosing the disease in in-calf cows before abortion takes place. If this were possible, affected cows could then be isolated before

they calve and more effective measures could be taken to prevent other cows becoming infected.

Blood Test.—As a result of these investigations, several tests have been developed, and, of these, the blood test, known as the complement fixation test, would appear to be the most reliable. This is a laboratory test which necessitates a small quantity of blood being taken from each animal that is to be tested ; the sample to be sent to a properly equipped bacteriological laboratory for the test to be applied. Since it is necessary, if the test is to be carried out properly, that every precaution is taken against contamination, these samples should be drawn by a veterinary surgeon.

The Abortion Test is a test somewhat similar to the Tuberculin Test for Tuberculosis ; this, however, up to the present would not appear to have proved so reliable as the Blood Test.

Immunisation.—The Ministry of Agriculture have also developed a method of immunisation which, briefly, is secured by infecting non-pregnant animals with the disease. This, after it has run its course, confers a protection against fresh infection when they subsequently become pregnant. The Board are prepared to assist breeders by supplying the necessary vaccine under certain conditions, and any wishing to avail themselves of this should apply to the Chief Veterinary Officer, Ministry of Agriculture Laboratory, New Haw, Weybridge, Surrey.

Sir Beville Stanier asked the Parliamentary Secretary to the Board of Agriculture whether he could give any figures showing the number of heifers or cows that had been inoculated against epizootic abortion, and the result during 1918. Sir A. Boscawen replied that separate figures for 1918 were not available, but in the two years 1917 and 1918, 33,866 doses of vaccine were issued. Owing to war conditions, complete returns were furnished only as regards 3,583 vaccinated animals, and amongst these the abortions amounted to 5·5 per cent., whereas amongst the animals which were not vaccinated, but which were on the same premises, the abortion amounted to 17 per cent.

Chapter IX.

DISEASES CONNECTED WITH PARTURITION.

It should be understood that the act of parturition is a physiological one, and that gestation and the bringing forth of young is in no sense an illness, or requiring that the expectant mother should be treated as an invalid. Working mares, like working bipeds, as a rule do better than more pampered individuals.

PERIODS OF GESTATION OF DOMESTIC ANIMALS, AND OF INCUBATION OF POULTRY.

	Shortest Period. Days.	Mean or usual Period. Days.	Longest Period. Days.
Mare	322	347	419
Ass	365	380	391
Cow	240	283	321
Ewe	146	154	161
Sow	109	115	143
Goat	150	156	163
Bitch	55	60	63
Cat	48	50	56
Rabbit	20	28	35
Turkey sitting on the eggs of the Hen	17	24	28
Turkey sitting on the eggs of the Duck	24	27	30
Turkey sitting on the eggs of the Turkey	24	26	30
Hen sitting on the eggs of the Duck	26	30	34
Hen sitting on the eggs of the Hen	19	21	24
Duck	28	30	32
Goose	27	30	33
Pigeon	6	18	29

Every stock-breeder should be something of an accoucheur, or at least understand the general principles guiding those who would give the necessary assistance in delivery.

Hasty interference is to be deprecated. The expulsion of the fœtus should be quickly performed in mares, and it is a fact that few foals are born alive if the dam is in labour more than half an hour. Cows, ewes, and sows may be in labour for a much longer time without danger to mother or offspring.

In single births, the new-comer should be presented head first and with front legs in a line with the passage. In the case of twins or multiple births "fore and aft" presentations are the rule, the breech presentment being usually second in order. Fig. 23 shows a normal presentation in a mare, Fig. 18 a fore and aft presentation in a ewe. In the great majority of cases

there is no need for manual interference. Where it is advisable either to explore or give mechanical aid, the accoucheur should first wash his hands and pare his nails back closely, then dip them in a disinfectant, and dress in

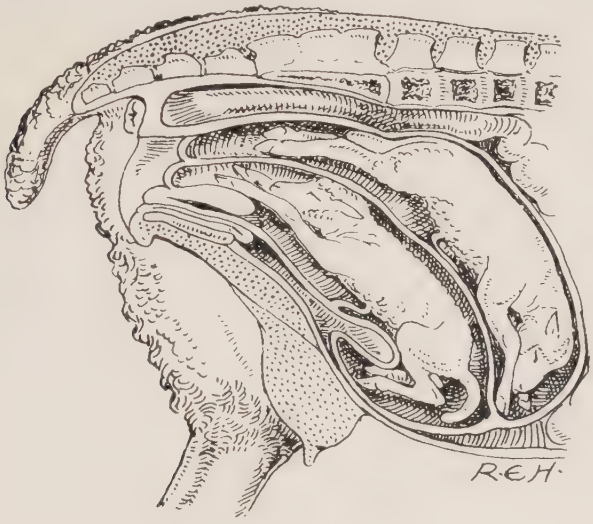


FIG. 18. LAMBING—TWINS, FORE AND AFT.

like manner all cords or implements to be employed. The force used in delivery is not the cause of death afterwards, but septic poisoning from abrasions of the membrane of the genital passage ; the most frequent being those

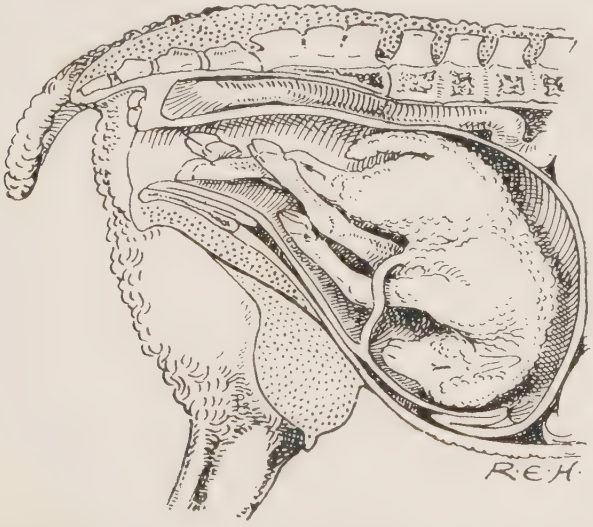


FIG. 19. LAMBING—ALL THE LEGS PRESENTING ; A CASE TO BE TURNED.

inflicted by the nails of men accustomed to laborious work, and therefore hard and insensitive when in contact with soft structures. Expulsion is often hindered by easily removable causes, as in Fig. 20, where one limb wants putting back and another bringing up : yet such cases are the most frequently

fatal, because the operator does not calmly examine with his fingers and decide which are front and hind legs and to which fœtus they belong. Look-

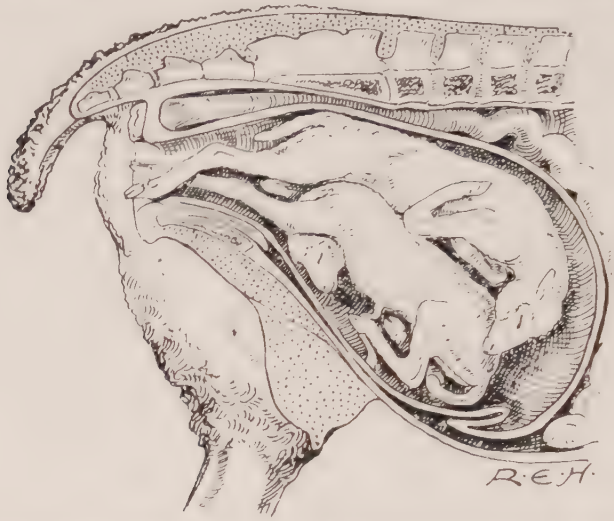


FIG. 20. LAMBING—FOREFOOT OF THE ONE AND HINDFOOT OF THE OTHER; NECK BENT

ing at the illustration anyone may see how all the efforts put forth will but serve to make delivery impossible. The writer has often found men hauling

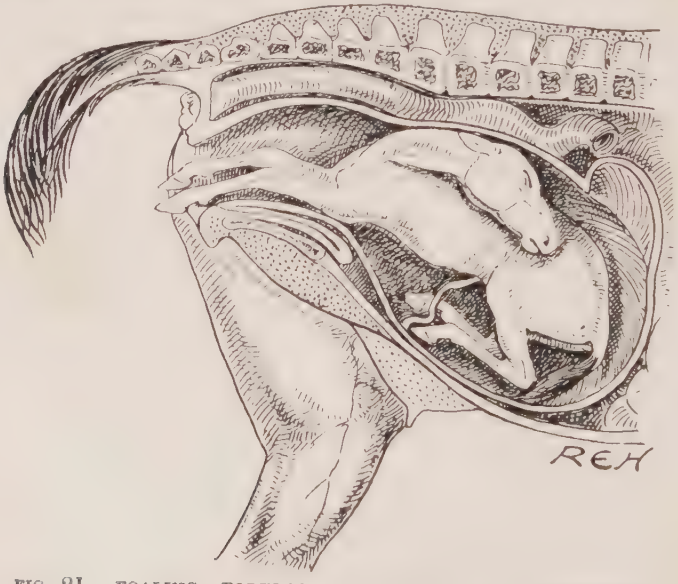


FIG. 21. FOALING—FORELEGS PRESENTING; HEAD DEFLECTED.

with ropes, a front and hind leg, or those belonging to twins, and, having put them right, had only to stand by and say, "Now, pull gently," and the thing has been done easily enough.

The foal shown at Fig. 22 wants those hind feet pushed down over the brim of the pelvis, and he will come away readily. Fig. 19 is just one of

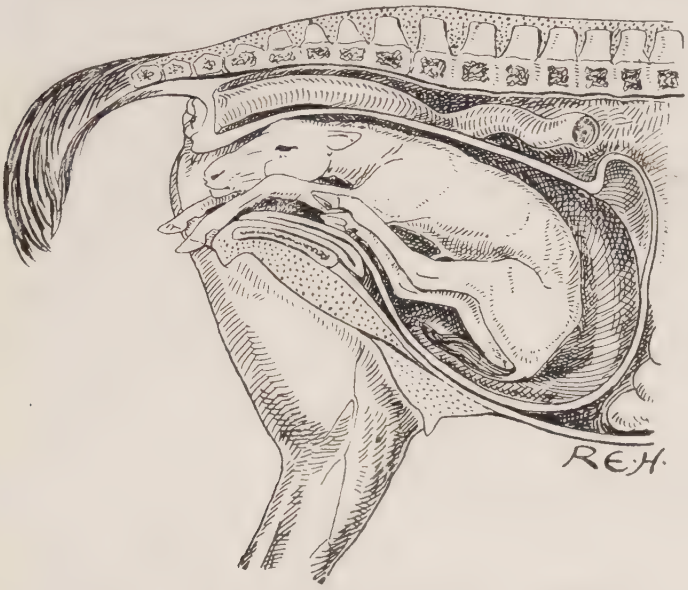


FIG. 22. FOALING—FOUR LEGS AND HEAD PRESENTATION.

those over which the novice gets into trouble. He finds a bunch of feet, and does not know how to distinguish them. The hocks should always

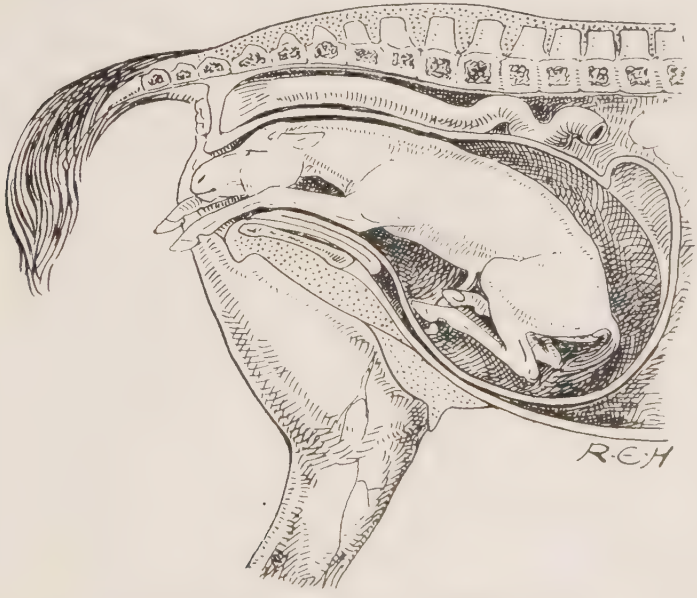


FIG. 23. FOALING—NATURAL PRESENTATION.

tell a hind leg from a front one, and the operator should feel up the limbs to the body, to satisfy himself whether belonging to one fœtus or two. This

case needs only to have one front limb pushed back, and a pull upon the two hind ones. One leg may be folded back, as in Fig. 26, but cannot be

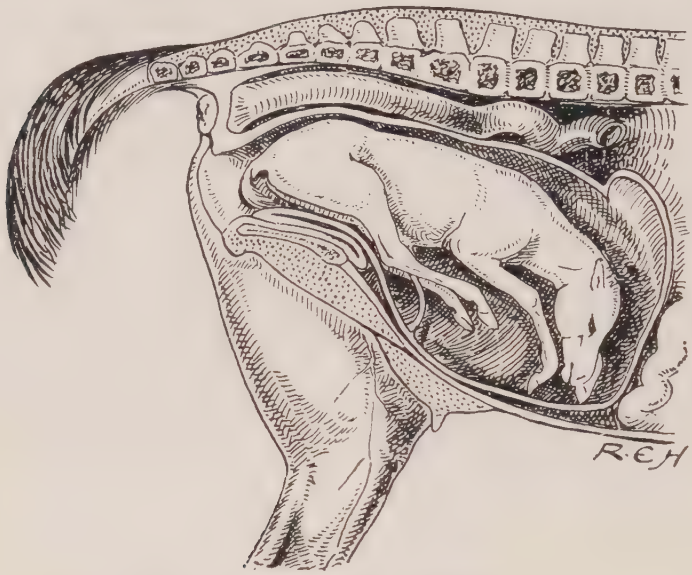


FIG. 24. FOALING—CROUP PRESENTATION.

got at, because the head and other foreleg are occupying all the available passage. The presented leg should be corded and pushed back, while the

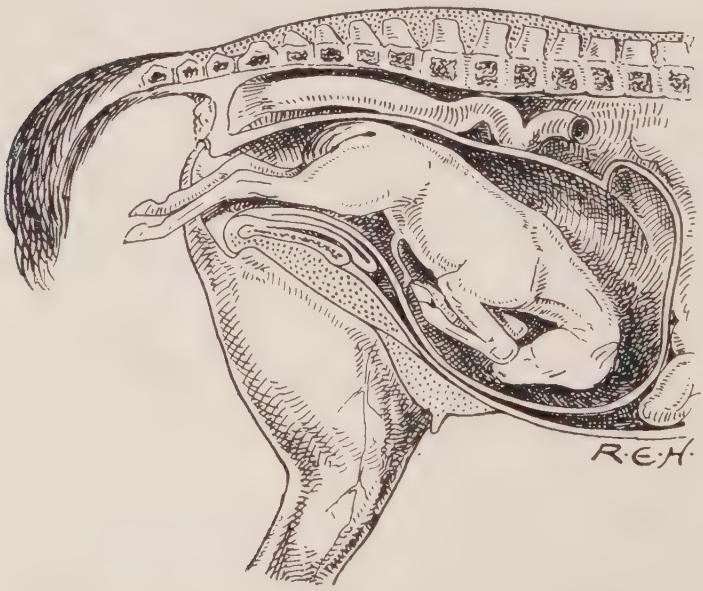


FIG. 25. FOALING—NORMAL BREECH PRESENTATION.

other leg is sought and brought into line. The difficulty is then over, but a pause should be allowed after every mechanical interference, until a natural

labour pain affords the opportunity of giving the extra "pound" which is often all that is wanted. Figs. 21 and 27 can be done nothing with until

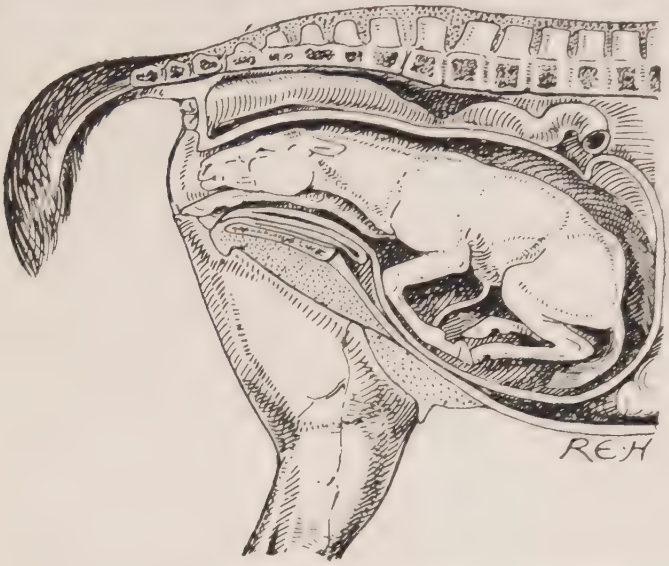


FIG. 26. FOALING—HEAD AND ONE FORELEG PRESENTING; ONE FORELEG DOWN.

the head is brought up. Here again we may impress the beginner with the importance of cording the fetlocks and not being afraid to lose sight of them

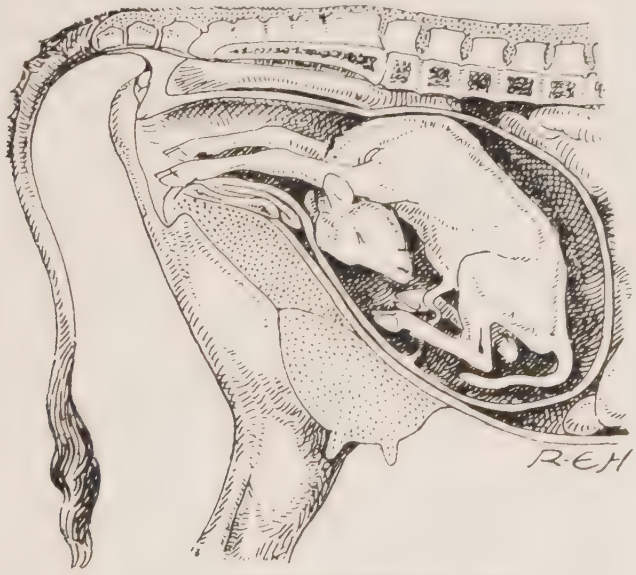


FIG 27. CALVING—FORELEGS PRESENTING; HEAD DOUBLED BETWEEN LEGS.

while put back to make room to work in. Fig. 25 is a normal breech presentation; while Figs. 20 and 29 are among the most difficult to deal

with. The secret of delivery in these cases is forcible pushing back with a crutch or other implement, while getting the hand down to pull up the hind

FIG. 28. CALVING—ALL FOUR LEGS PRESENTING; CALF ON ITS BACK.

legs. There is plenty of room forward, and no harm will be done by shoving the fœtus against the yielding viscera. Sometimes a lamb or calf may be

FIG. 29. CALVING—HOCK PRESENTATION.

turned over in the womb, but it is only by first pushing back, as indicated above, that any such movements may be made.

Again and again would I urge upon cowmen and shepherds what has already been said as to getting room to work in by *pushing back* and not

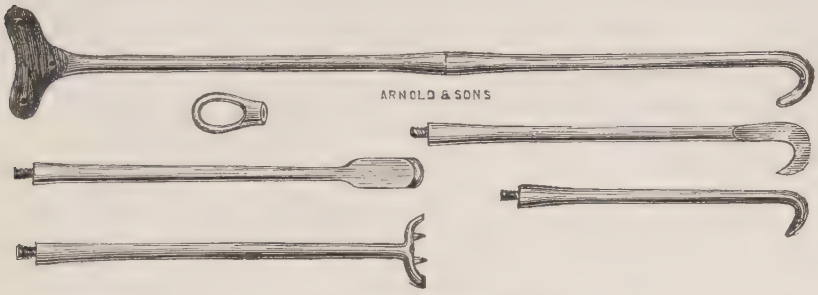


FIG. 30.—PARTURITION CRUTCH.

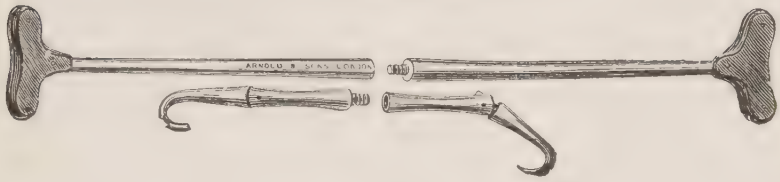


FIG. 30A.—PARTURITION CRUTCH.

being afraid to lose sight of a leg once seen. Fig. 28 is one that might be turned with advantage, or room obtained by pushing the front legs away.

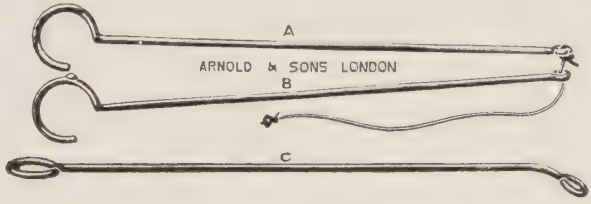


FIG. 31.—PARTURITION.

FIG. 31A.—PARTURITION.

FIG. 32.—PARTURITION HOOK.

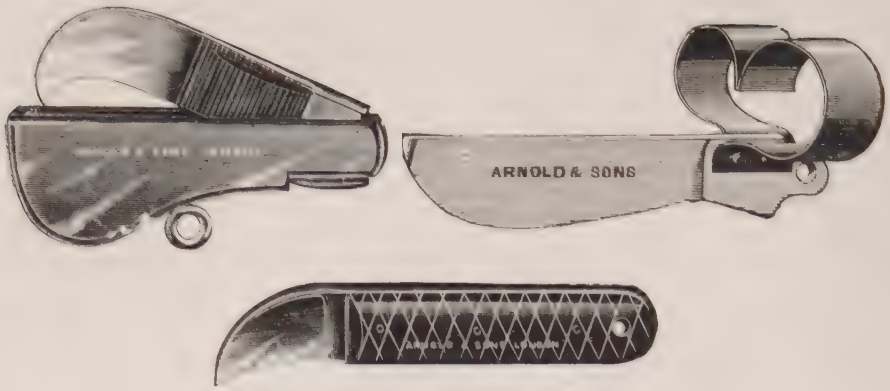


FIG. 33.—EMBRYOTOMY KNIVES.

Impractical delivery sometimes faces us, and we have to resort to dismemberment. Carrying in a knife without injury to the mother or one's own hand is not exactly the job to be given to a novice, but, failing the assistance of a veterinary surgeon, it may be attempted with an ordinary castrating knife, guarded between the fingers and thumb, and with the end of the handle resting against the ball of the thumb. Special knives are made for the purpose, as shown in the accompanying illustrations. The one point the author would impress upon the unhappy accoucheur is the absolute necessity of dividing the skin before attempting to dismember the fœtus. The skin is immensely strong, the muscles very easily broken up, and the joints detached with no very great effort. If, then, one makes a long incision through the skin, the fingers can be worked under it and the young creature literally torn to pieces.

MILK FEVER IN COWS, DROPPING AFTER CALVING. THE DROP.

The most dreaded disease of the dairy farmer has long been known under the above names. In veterinary works of all but the most recent date, it is referred to as parturient apoplexy, and was believed to be due to pressure of blood in the meninges of the brain and more especially of the neck portion of the spinal cord. Specimens exist in the pathological museum of the Royal Veterinary College, Camden Town, which were supposed to prove such engorgement, and the writer remembers them being handed round for inspection by the students. Now a wholly different view of the pathology of the disease is held; it is believed to be due to the liberation of some poison in the udder. Scientists have not decided what, and we must leave it at that for the present. What is of greater importance to the cow-keeper is the undoubted fact that the treatment based on the assumption of a poison or deleterious agent in the milk glands is vastly more successful than any previously practised.

The opinion has been pretty generally held that cows kept in high condition are more liable to milk fever than poor ones, but the writer, like every practitioner with much experience, has seen it often enough in the poor man's cow and the starveling. That it is a disease of deep milkers may be safely asserted, and one of the penalties of selection for special points or qualifications in a breed. The rich as well as heavy milking Jersey is more likely to go down than any other. All the butter breeds are more subject to milk fever than the butcher breeds. The Hereford and the Sussex of the old type, whose milk is only fit for rearing calves, and one at a time, are

scarcely ever known to suffer from it. Many views have been expressed by scientific and by practical farmers as to the cause or contributory causes, and means of prevention. Some of them are diametrically opposite, but held with equal firmness, and based upon inadequate observation over a sufficient number of animals and for a long enough period. A conscientious man adopts a certain dietary for so long before calving, or administers drugs or simple substances as preventives, and, having no case of milk fever occur in his herd, confidently asserts that he has discovered the panacea. He has "no fear" of milk fever, and if others followed his example they too might disregard it. He is impatient of the stupidity of those who will not adopt his methods, and bids good-bye to the vets., but we presently find that his luck is "out." The first victim to milk fever he accounts for by some slight neglect, the next makes him doubtful, and the following altogether knocks the conceit out of him; he cannot even look for the sympathy of his neighbours, on account of his previous presumption. In something over fifty years' experience I have seen every theory exploded, and every plan of management fail. If faith in anything is left to me, it is in drying off in good time, feeding on oat straw and hay, and keeping open the bowels with occasional doses of salts or linseed oil. For several seasons and among large herds this plan has been followed by exemption from milk fever; yet the same thing can be said of "fresh" cows on fat pastures, without any precautions and milked "through."

Many eminent cowkeepers and breeders of experience pin their faith on leaving the udder unmilked for forty-eight hours, as a means of preventing milk fever. Mr. Thompson, F.R.C.V.S., of the Aspatria College, advocated udder pressure long before the present treatment was adopted, and it would seem that the inflation and pressure obtained by the now usual plan of pumping up the bag has something to do with the success attained by the injection of oxygen or only of filtered air (*see* Treatment).

Symptoms.—At any time from an hour to a week after calving these may appear, and in a case at the Royal Veterinary College the cow belonging to the Principal (Simonds) dropped on the tenth day, and died, despite the attendance of the most eminent professor of cattle pathology, and his staff's best attentions.

In some districts there is a disposition to divide the disease into "the drop" and "the fatal drop," and there is some ground for this distinction. Some cows are unable to rise but retain consciousness, and are destined to recover. Whether such apparent paralysis is due to sprain of the muscles under the loins, or is the result of the lower portion only of the spinal cord being affected, it is difficult to say. If the cow gets worse and dies, in the usual way, we may ask ourselves whether the trouble crept up the cord to the brain, or whether real milk fever set in independently of the previous condition, in which the animal was merely unable to rise, or would not make an effort which cost her too much pain. Personally I am inclined to take the farmer's view and regard simple cases as those in which only a small amount of auto-intoxication occurs.

Some cows paddle with the hind feet as an early symptom, but this either escapes notice or does not always occur. The animal sways frequently before going down, and seldom deliberately lies down in the usual way; it is a sinking down or toppling over.

Judging by the natural position one sometimes finds a dead parturient cow in that has given no warning of anything amiss, one may suppose that the attack comes on while recumbent, during the night. With the advance of the malady the head is thrown round to the shoulder. It may rest in that position for some time, or the cow may be extremely restless, as if haunted by

bad dreams, throwing the head about, but unable to control it. Lying out flat on the side is a very bad symptom; still, cases have recovered after this. Most subjects moan and grind their teeth before complete insensibility overtakes them, and snore loudly afterwards. The flank is disposed to fill up with gases; the dung is seldom passed, and the urine is also retained. Milk generally disappears from the udder, but this is a very variable and unreliable

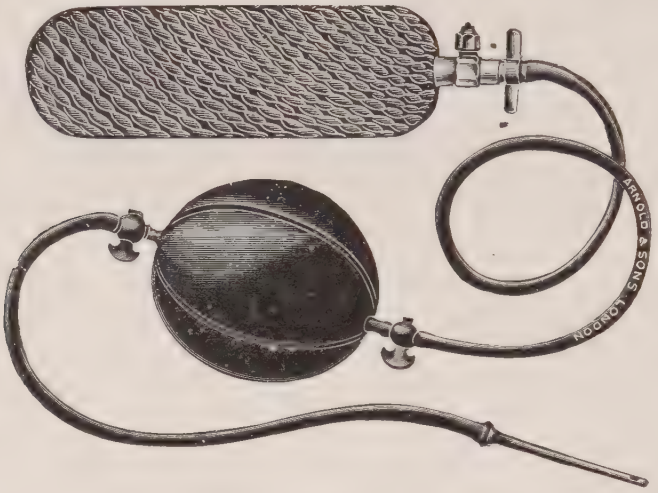


FIG. 34.—MILK FEVER OXYGEN APPARATUS.

symptom. The great characteristic symptoms of milk fever are paralysis and coma, or insensibility. Anyone who has seen a typical case will have no difficulty in diagnosing another.

Treatment.—Provide a comfortable bed, preferably of straw cut short, and so capable of being easily moved and not twisted round the animal's feet

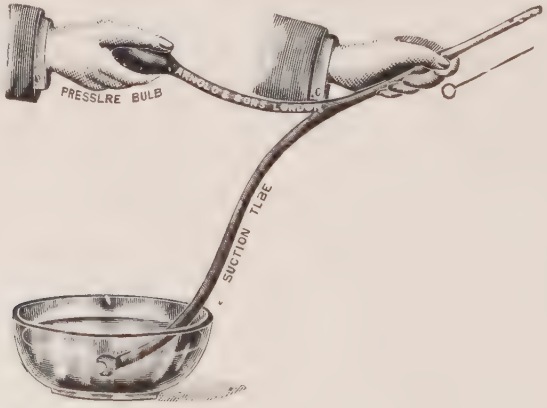


FIG. 35.—MILK FEVER SYRINGE.

or horns. A bag or two stuffed with similar materials, for propping up the head, or supporting any other part required. Rugs, sacking, or other warm coverings should be at hand, and the surface temperature kept up. The rectum may be carefully unloaded with a greased hand, and while the patient is sensible a saline purge may be given, as a pound of salts.

In this connection it should be said that many cows are killed by giving medicines while semi-conscious; the medicament goes down the windpipe, and inflammation of the bronchial tubes and lung substance follows, if immediate suffocation does not put an end to the animal. If no insoluble

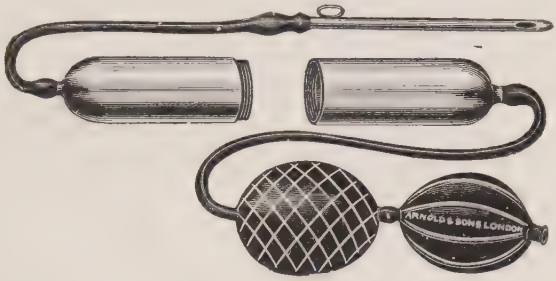


FIG. 36.—MILK FEVER AIR FILTER, WITH BELLOWS.

material is given, only a solution of Epsom salts, a few ounces going the wrong way will not prove fatal, although very much to be avoided.

So small a proportion of cows recovered under any of the old systems of treatment that we may disregard them, and describe the method first introduced by the Danish veterinarian Schmidt. It consists in introducing into

FIG. 37.—TEAT COMPRESSOR.

the udder direct, a solution of one or more substances which are believed to neutralise the self-developed poison or intoxicant. Schmidt used iodide of potassium, and still prefers it to any other drug. British practitioners often employ chinosol, the latter's preference for chinosol being due to the undoubted fact that garget does not follow its employment, while it not unfrequently does upon the iodide solution alone.

FIG. 37A.—TEAT COMPRESSOR.

These drugs in solution have been displaced by filtered or sterilised air, and lastly by oxygen. They all act in the same way by combining with the injurious toxine to neutralise it. The cow should be stripped, her udder carefully cleaned, and the apparatus to be employed should be sterilized.

The injection of a drachm of chinosol in a quart of water has the advantage of disinfecting the syringe, and should be passed through it, and the metal nozzle well soaked before introducing into the teat. Equal portions should be injected into the four quarters. A good deal of air should be pumped in after it: the teat to be squeezed to prevent its escape, and the bag massaged in order to distribute the medicament as well as the air forced in. Convenient clips are supplied for this purpose, which the veterinary surgeon will employ, as well as the most modern oxygen syringe which is here illustrated; but the unlucky amateur has generally to work with the fewest tools and worst appliances, and for this reason we recommend the chinosol solution, and a syringe which is convertible to several purposes in the hands of an intelligent man, who is sufficiently impressed with the importance of perfect asepsis or the need of attempting it, in all matters of surgical instruments or medical appliances. The syringe with a milk syphon or metal point will do for milk fever on one occasion, and, with a female nozzle attached, may be used for injecting a womb on another occasion. Oxygen is now kept in stock by the more advanced pharmacists, but time will be lost in getting it, and air is always ready. While giving the preference to oxygen, the cow-keeper will have to decide according to circumstances, and need not despair because he has not the latest apparatus at hand.

The injection may be repeated in six or eight hours if consciousness does not return, and again some four hours later, but with any marked improvement the remedy should be discontinued and the treatment confined to making the patient comfortable (*see* chapter on the Care of Sick Animals). It is thought that the stimulation of the region along the spine with a warm liniment (*see* Liniments) is beneficial in restoring function; also hand rubbing the legs. While the patient is down, she should be turned on the other side, at least twice during the day. Veterinary surgeons sometimes empty the bladder with a catheter, but it is doubtful if this is often necessary, since the secretions and excretions are at a standstill in a really bad case: little urine accumulates, and not much movement takes place in the bowels; it is a hopeful sign when the rectum is found to contain fæces again, after back raking. Recovery often takes place very rapidly, and once the cow gets on her feet there appears to be little amiss with her. She is, however, liable to go down again, and if so she will have but a poor chance. I have seen recoveries after a second collapse and complete insensibility, but such cases are rare. Those patients which remain on the ground a long time, although conscious, are very disappointing: they often get lung troubles and die of congestion at a time when one is hoping to see them get up. Cows with tuberculous deposits are very apt to go wrong if they drop after calving; it is the opportunity of the disease, so to speak. Tuberculosis in the cow, like glanders in the horse, will often lie latent until some feverish cold or other illness favours its development.

DROPPING BEFORE CALVING.

Cows are occasionally found down and unable to rise a little while previous to the date when they should calve. Poor, weak, or old cows are the most frequent subjects. Those better favoured are not wholly exempt, but in the case of the latter it is assumed to be due to pressure upon some great nerve trunk or blood-vessel which causes partial paralysis. The former will sometimes remain on the ground until parturition takes place, and then get up and do well; some will calve all right, but never have the strength to rise, and remain prone until lung trouble finishes them. In the case of cows in fair condition it is well to give a moderate aperient, such as a pound of salts and an ounce of ginger, followed by a pint or so of linseed oil next day, and

a couple of pounds of black treacle. With movement of the great viscus of ingesta the pressure is relieved and the desired result obtained. Good feeding and nursing will save some of the poor ones: there is no special treatment and no medicines which will make up for past neglect and ill-usage.

MILK FEVER IN SOWS AND BITCHES.

Sows do not show milk fever in the same way as cows, but they are subject to true parturient fever, sometimes accompanied by paralysis, or fits. It comes on as the result of arrested secretion of milk, from exposure to bad weather, or sudden cold, and septic infection and the form of it referred to as eclampsia in bitches, when the attempt is made to suckle too many young.

Symptoms.—The sow ceases to take interest in her family, often crushing them in her half-blind movements, and not heeding their cries. When down the pigs are seen trying in vain to obtain nourishment. The eyes seem smaller, and if the membrane is examined it will look bright red. The temperature will be some degrees above the normal, when tested by the thermometer per rectum or vagina (*see* Temperature, &c.). There is constipation, retention of urine, and what passes is high-coloured and strong-smelling. Paralysis of the hind extremities or inability to co-ordinate the movements may or may not be a symptom. Food is refused, or the effort to reach it proves too much. In place of the above train of symptoms we may have to deal with a sow in a great state of excitement; staring eyes, rapid breathing, trembling; "seeing the devil," as a pig-keeper once described it to me. I have seen this form within a few days of farrowing, but more often at a month, when a large number of pigs have drawn too freely on the maternal nutriment. It is commonly mistaken for a fit, and indeed so far partakes of that character that the tongue may be bitten and impaled in such a way that the sow cannot herself release it.

Treatment.—The first form. Fence off the pigs where the sow can see them. Give her a bold aperient dose, such as a drachm of aloes dissolved in half a pint of hot water, together with four ounces of Epsom salts—more for a big white, and less for a Sussex or small breed. If a tractable sort, it will help matters to use an injection of soap and warm water per rectum; but pigs should not be fought with until exhausted, in order to give medicines: guile, not force, is to be practised whenever possible, and if the sow has any appetite she may take a further laxative in the shape of linseed oil in some favourite food, especially if accustomed to special condiments or other aromatics. The loins may be stimulated with soap liniment, or a weak ammonia liniment (*see* Liniments and Embrocations). If the bowels respond well and promptly the animal usually recovers. She will benefit by tonics, as small doses of nux vomica and gentian (*see* Table of Doses). She should be hand milked at frequent short intervals, while unfit for the society of her offspring, and these should be returned to her as soon as it appears safe to do so.

With the "fitty" form, or eclampsia, the same precautions should be taken to save the pigs from accident, and with a view to their entire removal, or the majority of them. The "darling" or perhaps two pigs may be left for her peace of mind, when getting better. An aperient should in this case also be given, but a dose of castor oil or linseed and castor oil will be sufficient. Without waiting for its action, she should have a sedative administered, and of these chloral is the most suited to the sow. Five to twenty grains is a dose under these circumstances, and the safest way (and in my experience most effectual) is to repeat seven or eight-grain doses every three hours until she quietens down. Two tablespoonfuls of water are sufficient in which to dissolve the dose, and this can be slowly introduced into her cheek, without the struggle of drenching. One may even dip a clean sash tool in the medicine

and get it into a sow, by repeated painting of the lips. A solution may be given the other end with almost (not quite) as good effect. With the passing of the urgent symptoms and removal of the cause—namely, the excessive drain on the system—the effect ceases, and the animal recovers.

MILK FEVER, OR ECLAMPSIA, IN BITCHES.

What has been said of sows above, with regard to the second form of milk fever, applies to bitches. These being more tractable may be put into a warm bath; and chloroform may be given on a sponge in a paper cone (*see* Anæsthesia and Methods of Control). The pups should be taken away until the first acute symptoms have passed, and then shown to the bitch; if she shows great concern and affection, one or two may be returned to her, but the rest should be provided with a foster mother, or otherwise disposed of. A mild aperient, as a dose of castor oil and buckthorn or a few grains of cascara sagrada, should be given, and every three or four hours a dose of bromide of potassium or ammonium. From five to twenty grains may be employed for different-sized dogs. Five will be a full dose for a very small dog, and twenty will not be too much for a St. Bernard dog or Great Dane. There is, however, very slight risk of overdosing with the bromides in dogs; they bear them well. Stimulating the spine with one part of turpentine and four of olive oil may be practised, and the deals should be frequently worked with finger and thumb. A little exercise twice or three times a day, and the most nourishing and easily assimilated food should be given, to rebuild and supply the rapid waste caused by excessive milking. Unless a bitch meets with some fatal accident during the first "fit," she will almost certainly recover. When fits of this or any other kind occur, one should always see that the tongue is not fixed between the teeth, and if wounded use a wine cork as a gag, and put a clove hitch on the face, to prevent the tongue from being again impaled.

INFLAMMATION OF THE WOMB, METRITIS, PARTURIENT FEVER.

Mares, cows, ewes, bitches, sows, cats—every animal with which we are acquainted, is liable to acute inflammation of the womb shortly after parturition. It may occur in a few hours, or not until two or three days after giving birth.

The cause is to be found in the entrance into the tissues of septic germs through an abrasion in the membrane. It is not always to be traced, and it is a well-known fact that many cows make good recoveries after a lot of pulling about, while others succumb to this form of inflammation which have had a comparatively easy delivery. Where any assistance is given by men's hands, it is easy to conceive of small abrasions being caused by the finger nails, and where ropes or any kinds of implements come in contact with a delicate membrane, it is wonderful that so many animals escape subsequent inflammation. It may be assumed with some certainty that a higher degree of immunity exists in some animals than in others, and that many abrasions occur without the entrance of germs or that they meet with sufficient resistance from the healthy tissues. Cows which have suffered exhausting journeys and calved on the road or in railway trucks, markets, and fairs, and otherwise undergone hardships at this critical period, are very much oftener the victims of the malady than those enjoying a reasonable amount of comfort.

Symptoms.—Sudden loss of appetite, restlessness, paddling with the hind feet, total suppression of milk. If a little milk can be got out, it will be changed in colour, perhaps very dark or curdled and having a peculiar odour. The "shape" may be contracted or swelled up, and the inside lining a deep red or purple, or showing bright red spots and streaks. The animal strains

continuously and discharges a liquid of the colour of coffee and having a very bad smell. The patient rapidly loses strength and a fetid diarrhœa follows: the extremities grow cold and the animal sinks and dies of exhaustion. Getting up and down and kicking at the belly is a common symptom, and in mares the complaint often "falls in the feet," as it is called (metastasis), and fever in the feet has to be dealt with instead, or in addition to the original trouble (*see* Laminitis). In some lambing seasons a great number of ewes are affected, when it probably becomes infectious through the atmosphere as well as by contagion conveyed upon the shepherd's hands.

Treatment.—Since it has been recognised as a form of poisoning or septicæmia, the treatment has been more especially directed to disinfection of the uterus and of vaginal membranes by copious injections of carbolic acid, permanganate of potash, lysol, chinosol, creolin, eusol, or other agents of the same class. Permanganate has the disadvantage of decomposing with glycerine (*see* Disinfectants and Antiseptics), and a 2 to 4 per cent. solution of chinosol or carbolic acid is preferable, as these things combine with it and help to sooth painful surfaces. In the case of ewes, special benefit has been observed to follow the dressing of the membranes with carbolic oil, which may be used as strong as 10 per cent., but 6 or 7 per cent. may be repeated with greater safety. The animal's strength should be kept up with alcoholic stimulants until the crisis is past, then to be discontinued by degrees. Brandy,

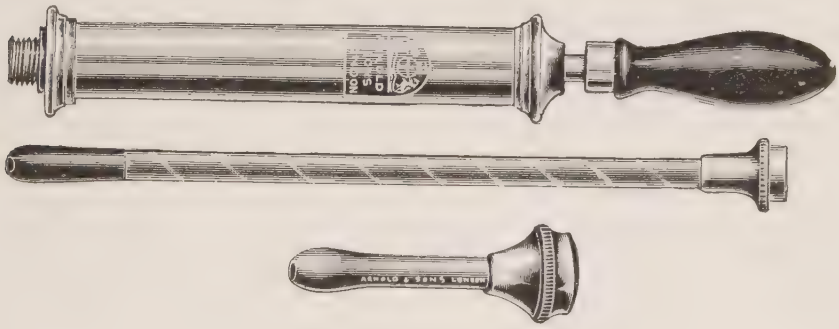


FIG. 38.—ENEMA AND VAGINA SYRINGE FOR LARGE ANIMALS.

whisky, or gin may be used, but a better mixture, and one offering no temptation to nurses to "sample," can be made of one part of tincture of gentian, one of compound tincture of cardamoms, and three of spirit of nitrous ether (*see* Table of Doses) every four hours. Linseed and other gruels may be horned down if food is refused, but whatever is offered should be cooling and sustaining.

Sows and bitches are too susceptible to carbolic acid to make the above recommendation in their case, and one should be content with a safe and equally good disinfectant, such as chinosol and glycerine. Cats and rabbits are even more easily poisoned by the absorption of carbolic preparations, either injected or employed upon the skin.

RETENTION OF THE PLACENTA. NOT CLEANSING.

Mares seldom retain the after-birth or placental membranes for any length of time. Sows and bitches commonly expel the envelopes immediately after each birth, so that these membranes or "after-births" only which belong to the last of the litter are liable to be retained. There may be such retention in each horn of the uterus, and in this way of course two sets of placental mem-

branes retained. It is with cattle and sheep that the trouble comes. Their fœtal envelopes are attached in a different way, and the union is of quite another character. The cotyledons or "roses" form a number of strong attachments which are only found in ruminants.

Causes.—Retention is most common where the full period of gestation has not expired at the time of birth. The animal which has not cleaned properly at the first calving has been observed to retain the membranes at subsequent parturitions. It is more common in countries where cows are worked in the yoke, as in France. Retention is not always due to adhesion of the "roses"; the placenta may be held by the neck of the womb (*os uteri*) closing prematurely. Some of the conditions which favour abortion appear also to contribute to retention of the placenta, as in those years when mouldy and bad forage is used cases of the latter are more numerous. There are a great many theories entertained with regard to this trouble, but they are incapable of proof. One of them which finds a good deal of favour is that of oil-fed animals giving the least trouble.

Treatment.—While the risk attendant on the retention of the placenta has been greatly exaggerated by writers of small practical experience among stock, it must be conceded that many animals suffer in health showing increased temperature, giving less milk, having impaired appetite, and enduring a decomposition within the genital passage which may at any time become a source of blood-poisoning. No hard-and-fast rule can be laid down as to attempting the removal of the cleansing. In mares, sows, and bitches there is very little risk, if any, in drawing away the placenta by gentle but continuous traction, as the attachments are few and slight, but with ruminants some time should be allowed to elapse before doing so.

It should be quite understood that early and forcible extraction may set up hæmorrhage, and even cause the death of the animal; indeed, such cases have been known in many parts of the country, and most young veterinary surgeons have got into a bit of a mess in their anxiety to display their skill before acquiring the needful experience which brings caution. The writer was one of them. If the animal has not gone its full time, three days may be allowed to elapse before any attempt is made to get away the placenta. If the full period has passed, and, as often happens with a bull calf, an extra three weeks, we need not exercise so much caution. After two days have gone by without progress it will be safe to wind a couple of sticks, or, with a towel, or wisp of straw, or hay, roll up the parts already extruded, and exert a moderate degree of force. With a little practice, one can feel if the detachment is taking place safely. It is quite a different sensation from stretching and tearing of the membranes. What generally happens is that some portion separates and some areas remain firmly attached. It is then best to rest satisfied with the progress made for that day, to inject a warm antiseptic, turn the cleansing over to ensure proper disinfection, and attach a weight, resuming the performance next day and *de die in diem* until the whole comes away.

Cleansing drenches have long been popular, and, it may be, exert some influence where a uterine stimulant is included in their composition, but the majority of those sold by competitive drug stores for a few pence consist merely of half-dried Epsom salts coloured and "nosed" with a little ginger or a cheap essential oil.

For many years I was put off using a small quantity of ergot in cleansing drinks because experiments with large doses of ergot on pregnant animals failed to produce any effect. It has since been ascertained that the ergot used was absolutely inert, and the experiments were therefore worse than useless, because they led to wrong conclusions. The practical farmer of that

day who believed that small quantities of ergotised grasses might lead to abortion was probably right. The vast amount of correspondence from various sources, which brings the writer into touch with stockmen in every part of the country, gives one a wider view and more extended opportunities of observation than are afforded to more scientific men, whose researches are confined within a few parishes, or who base their opinions on laboratory experiments. The wisdom of being "the first by whom the new is tried; the last to lay the old aside," is forced upon one as experience accumulates and prejudice evaporates. Ergot is beyond question a contractor of the uterus in the human subject. It probably acts in the same way on animals. If so, it is a desirable adjunct to the cleansing drench. A drachm to two drachms of ergot, purchased from a reliable druggist, four to eight drachms of aloes, two ounces of bicarbonate of potash, and ten to sixteen ounces of salts may be taken to be a useful formula for such drenches.

Laurel berries and savin act as uterine stimulants in ruminants, and aloes may be given to the robust in combination with salts. The following is a suitable drench for an otherwise healthy cow that has not cleansed in good time :—

Laurel berries, freshly crushed	½ ounce.
Oil of savin	1 drachm.
Barbadoes aloes	2 drachms.
Ground ginger	1 ounce
Epsom salts	¾ pound

To be mixed with a quart of hot water and given warm.

Some dairy farmers and veterinary surgeons advocate the giving of such a dose within an hour of calving. There can be no harm in it, and, where the animal is at all fresh or full of condition, it may be regarded as a partial insurance.

BLEEDING AFTER DELIVERY. FLOODING. POST-PARTUM HÆMORRHAGE.

This seldom occurs in animals to any alarming extent, unless as the result of violence in removing the fœtal membranes (*see* previous page).

Treatment consists in applying cold water to the loins, injecting astringents and antiseptics, pressure over the chine to keep the animal from striving, and absolute quiet. The most suitable injection is one composed of tincture of kino one part, glycerine two parts, water twenty parts. If nothing is done, nature commonly arrests the bleeding by formation of a great clot, but this is liable to prove a source of poisoning, and should be carefully removed by syringing out with warm water in which a tablespoonful of salt to each quart has been dissolved, afterwards using a solution of alum, of the strength of a teaspoonful to each quart of water.

COMING OUT OF THE WOMB, FALL OF THE CALF BED. EVERSION OF THE UTERUS.

This accident may occur at any time within three days of parturition, but most frequently immediately on delivery, during the after pains or expulsive efforts, which should only serve to get rid of the placenta. All animals are liable to it, but cows and ewes more than others. The extrusion of the vagina or outer portion of the genital apparatus is mistaken for the more serious one by those who have not seen the great volume of the womb hanging down. Some cows habitually have a portion of vagina extruded from the shape when recumbent, and on rising to their feet it returns. They are more liable to calving troubles, and should not be retained in the herd unless for some special reason. Eversion of the uterus will certainly result in death unless successfully returned or excised, and with the best of surgeons there

will be a large proportion of deaths. It generally happens in the absence of the cowman or attendant, and the first thing to be done on discovering it is to secure the animal and seek assistance. Too often the cow has trodden and fatally injured the womb, or it has collected a lot of litter and dirt. No one would undertake the operation of returning the womb if he could get a veterinary surgeon for the purpose, but every hour's delay adds to the risk, and it may be better to attempt to do it oneself than to wait indefinitely. Whether or not professional aid is expected, the womb should be secured from injury by placing under it a sheet soaked in an antiseptic, and all dirt carefully sponged off; this will prepare it and save for a time from the danger of infection. In order to effect its return, two men should stand behind the cow, one on either side, and support the sheet containing the womb, while the operator, with hands rendered aseptic (*see* Antiseptics), manipulates the mass. One should avoid injury with the nails, and as soon as the clenched fist can be introduced the better, pushing continuously as long as it yields readily. There is no difficulty in distinguishing between the pressure against one's hand which the cow exerts and that which is due to the weight of the womb or a twist in it, which hinders its return. When for the first time one engages in this performance the great bulk of the womb is appalling, but experience teaches that there is very much more trouble in keeping it inside than in getting it there.

As soon as returned the animal should be given a large dose of sedative medicine, such as (for a cow) two ounces of laudanum in half a pint of linseed oil, or 6 drachms of choral, and proportionate doses for other animals (*see* Table of Doses). The lips of the vagina should be secured with sutures of strong tape or leather, a wide hold being taken. Much preferable to any stitching is the clamp invented by Mr. West, and now obtainable of all veterinary instrument makers. A variety of trusses have been applied for the purpose of keeping the uterus from coming out again, and any contrivance which will press against the pubic region is helpful, but the smaller animals, as sows and bitches, generally succeed in displacing them. Mares and cows can be made to stand with their front feet lower than the hind ones, and this position favours the case. After reposition of the uterus, a morphia suppository may be left in, but readers are warned against the champagne bottle or any other mechanical contrivance inside, for so long as any foreign body is there the patient will continue to strain.

FIG. 39. WEST'S VULVA NEEDLE CLAMP.

In cases where the extruded organ has been injured or begun to undergo gangrene it has been successfully excised, care being taken to ligature tightly before dividing it. It is, of course, a last desperate resource, but with careful antisepsis and soluble sutures is worth the attempt.

The young should not be taken away, but allowed to suck, as this has always an influence in bringing about the natural contraction of the womb.

RUPTURE AND LACERATION OF THE UTERUS.

As a consequence of difficult labour the uterus and vagina may be ruptured or torn. If the former, death nearly always follows from escapes of fluids

into the abdomen and peritonitis (*see* Peritonitis). If the injury does not extend to the whole of the coats—if, that is to say, there is no actual perforation—recovery may take place, if the parts can be kept aseptic by frequent irrigation with suitable agents. A very slight injury such as might be caused by the finger nail will often be sufficient to cause inflammation of the womb (which see). Rupture of the vagina occurs in the same way, notably when the fœtus is roped and undue force employed during the intervals of labour and prior to the fullest dilatation of the parts. When this accident occurs, the intestine may come through, and it should be carefully returned and an attempt made to suture the wound, since a few cases recover under the most apparently hopeless conditions.

EVERSION OF THE BLADDER.

Parturition is sometimes hindered or wholly prevented by the bladder coming out and occupying the vagina. Clumsy obstetrists with but little knowledge of anatomy have pricked it, thinking it was the water bladders or placental membranes which commonly present themselves immediately before the fœtus comes into the vaginal passage. Such a mistake is almost certain to cause death. It must be replaced by pressure from the fingers; a not always easy task when it has been out long enough to have become thickened and inflamed.

It is met with after parturition, as well as prior to it, and the treatment is the same; avoiding the introduction of dirt and septic germs by careful washing of the hands and syringing out with antiseptics. A dose of belladonna (*see* Table of Doses) should be given, and the patient kept very quiet.

WHITES, LEUCORRHŒA.

A discharge from the vagina has been referred to under the name of gonorrhœa, and as the result of contagion. Another kind of discharge occurs in female animals of all species, but more especially from the mare and cow, and is known as "whites." It is due to a chronic form of inflammation; perhaps originally acute, and following upon a difficult or protracted labour, or as the result of old age and debility.

It is a white glutinous fluid without any ill odour as a rule, but occasionally mixed with pus-like matter, and then of a dirty brown colour and offensive smell.

Treatment.—In any but long-neglected cases it will usually yield to the frequent injection of 4 per cent. solutions of sulphate of zinc (at blood heat) or of alum or chinosol. If one astringent does not succeed, another should be tried, and sulphate of iron or nitrate of silver changed for carbolic acid and glycerine. The whites are almost always accompanied with debility, and tonics should be given internally, preferably iron and gentian or quinine (*see* Table of Doses).

PUERPERAL MANIA.

Cows are occasionally the subjects of temporary madness after calving. It is a rare disorder, but very alarming when it occurs.

The symptoms are not easy to distinguish from those of rabies, and the few animals that have come under the author's observation were very violent, charging the mangers and walls, and destroying everything within reach. One broke her horn off and grasped things in her mouth exactly as a dog would do. That it was not rabies was proved by her recovery in the course of a few days.

The exact nature of the disease is not well understood, but appears to be due to the absorption into the system of some toxic material. It may be

the same poison which causes paralysis (milk fever) acting as an excitant instead of a somnolent. There is nothing inherently impossible in this, as in our own species we frequently see excitement, depression, somnolence, mania—all as the result of poisonous doses of alcohol.

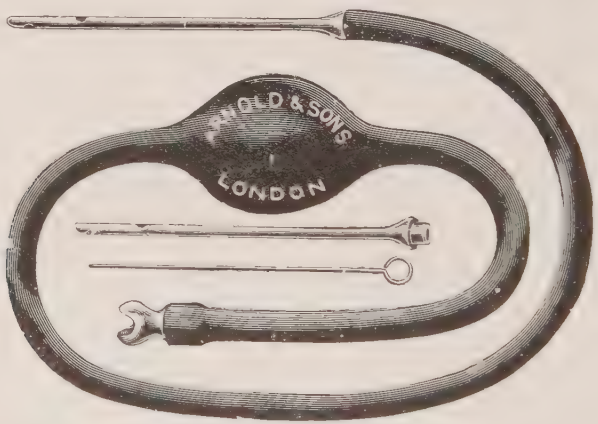
Treatment.—If the animal can be secured and a bold aperient administered, such as an ounce of aloes, two ounces of nitre, and a pound of salts, she will most likely become calm by the time the medicine acts. Bleeding from the jugular vein is calculated to relieve it quickly, but a mad cow is not the easiest subject for operating on, and ugly accidents may happen.

PARTURIENT LAMINITIS. FEVER IN THE FEET.

This disease may supervene upon any other as a post-parturient trouble, and is referred to under the heading of fever in the feet (*see* Laminitis).

GARGET, MAMMITIS, MASTITIS, FALL OF THE UDDER, CAKED BAG, HARD BAG, ETC.

What a trouble to the dairy farmer—ay, and to the veterinary surgeon—are these hard bags; causing much serious pecuniary loss to the former, and bringing but little credit to the latter, when his best efforts are put forth!



40.—UDDER SYRINGE FOR MILK FEVER OR INJECTIONS FOR GARGET.

Causes.—There are a great many causes, no doubt, but some dairies are comparatively free and others never without a cow with a bad udder. Hardships about the time of parturition and before it are believed to account for some considerable number, but the best-managed farms, with capable milkers and under good supervision, do not altogether escape. Apart from an infective mammitis which is now well proved, there are many unsatisfactory cases of swelled udder and lost quarters, which cannot be traced to any of the causes commonly assigned. In one large and particularly well-managed establishment I believe it has been due to a ration too highly nitrogenous—for in this dairy I was enabled to make inspections at all sorts of times and examine milkers and cows when least expected.

Bad Milking.—Failing to strip the cow is often assigned as a cause of garget: we all know it to result in shortage of milk, but as a cause of bad udder it seems doubtful, in view of experiments made upon cows in overstocking. In this connection may be quoted the remarks of Professor Dewar before the Scottish Metropolitan Veterinary Medical Society: "It would be

a very difficult job to obtain a conviction for hefting in cows, unless some artificial means were taken to prevent the milk escaping from the teats. He once practised in the country where calves were very dear, and where it was the custom to keep the calves and two-year-old heifers until they were about fat. At calving times the calves were taken from the heifers and they were never milked. Their teats were not even drawn, and they were sold in a month or a little over, fat to the butcher, and the farmer had his calf, which in that district was worth about £4, besides the value of the cow. He never knew of mammitis resulting from this method of treatment."

Our own view is that most cases of garget arise from the invasion of deleterious organisms through the open teat, when the sphincter muscle is relaxed after milking (or sucking) and the cow lies down on dirt. The orifice, which looks so small to us, is as big as a barn door to the streptococcus which is the probable offender. We do not now refer to the specific infection, which is comparatively rare in these islands but common enough on the continent of Europe. Our reason for entertaining this view of common cases of swelled and hard udder is the habitual failure of measures of the usual kind for the reduction of inflammatory swelling and the large amount of success, on the other hand, which attends the early injection of a disinfectant such as chinosol or perchloride of mercury; the latter being used at a strength of one in two thousand of water for common forms of mammitis, and, for septic inflammation, one in fifteen hundred. The perchloride was found the best remedy in a genuine outbreak of septic mammitis in Cheshire in 1908.

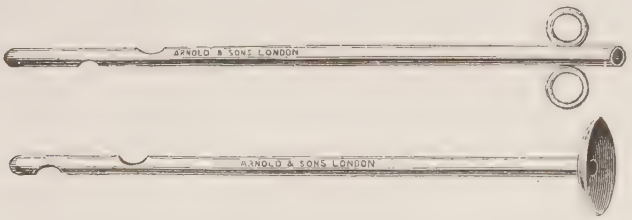


FIG. 41. MILK SYPHON.

If the temperature of an animal suffering from garget is taken per rectum—not the temperature of the inflamed gland, but of the body—it will be found very high. In cows, a reading of 107° and more is quite common, and in one case recorded by us in the veterinary press 109° Fahr. was reached. This has since been surpassed. It may be remarked, *inter alia*, that no animal could live long with such a temperature, and the experience of all is that it soon runs down again. (*See* Temperature of Animals.)

Mares, sows, and bitches are much less prone to mammitis than cows. They are not usually hand milked. There are more cases of garget in sheep in those countries where ewes' milk is drawn by hand. Sows and bitches seldom suffer such serious constitutional disturbance as do cows and ewes. A gland or two may be lost, but compensation is found in the remaining deals for the offspring. Blind quarters are always a source of danger at the next parturition, when awakened into activity, and, unless some special reason exists for getting offspring from an animal so affected, she should not be bred from again.

Treatment.—A cooling dose of medicine (*see* Physic) should be given as soon as anything is noticed amiss with the udder. The milk (or the changed fluid which takes its place) should be drawn and an injection of a suitable disinfectant sent up without delay. There is nothing better than solution of chinosol with glycerine, 1 or 2 per cent. of the former and 6 or 7

per cent. of glycerine with water. At a time when chinosol was unobtainable excellent results were obtained by the injection of peroxide of hydrogen, in the proportion of one in ten of water. Many practitioners consider this more valuable than chinosol, especially in cases of some duration. The apparatus used for this purpose is illustrated in the remarks on milk fever or parturient apoplexy. This injection may be repeated night and morning, and after each dose the udder should be massaged with a simple emollient, as marsh mallow ointment, spermaceti ointment, or melted lard. Much benefit appears to result from iodine ointments. The following formulæ may be specially recommended: Iodide of potassium, one ounce, about half an ounce of water, to liquefy with the aid of pestle and mortar, and seven ounces of lard, incorporating the ingredients thoroughly. Doses of two to four drachms of iodide of potassium in water given daily have the effect of causing absorption of inflammatory products, without ill effects. Resublimed iodine one part, lard twelve parts, by weight. Camphorated oil may be recommended where there is much pain, and should be liberally employed. An embrocation of half soap liniment and half soft water is also suitable, or one part formalin to one hundred parts of lard. Whatever is selected for this purpose should be of a nature which will bear frequent repetition. Strong embrocations of so-called white oils only add to the pain and inflammation, and a second application is torture to skin already peeling.

FIG. 41A. MILK SYPHON WITH TWO RINGS.

In many cases of garget, the passage is blocked by morbid products; the discharge being sometimes watery, at others pus-like, or containing granulations. Every effort should be made to get these away, if necessary, by introducing a teat syphon to clear the duct.

Early neglect leads sometimes to such a degree of inflammatory action that the whole quarter dies. After much suffering on the part of the patient, a line of demarcation is set up, and the tissues are seen to be separating. Nature casts off the whole quarter, and leaves a great gaping wound which, once clear of the dead mass, heals up in a surprisingly short space of time. A cow that has entirely lost a quarter by sloughing in this way is safer for stocking again than one which has had less trouble, as there is no glandular substance to become inflamed at the next calving, and the remaining quarters have been known to yield almost as much as the four did prior to the accident. A lost quarter, whether literally lost or only functionally imperfect, is a very serious detriment to a cow, and greatly reduces her value.

BLACK QUARTER. INFECTIOUS MAMMITIS.

Permanently on the Continent, and occasionally in this country, a disease makes its appearance which is frequently fatal to cows, and more particularly to ewes. It is due to the invasion of an organism which causes the udder to quickly turn purple and black, and if the animal lives, the gland is sloughed. So fatal is this malady in the flock, that no attempt should be made to save the gland, but only the life of the patient.

As soon as the victim shows symptoms, the udder should be punctured in a number of places with a hypodermic syringe and a solution of perchloride of mercury injected. The strength for this purpose may be that of one in five hundred of water. For no other condition of the lacteal glands should it be employed of greater strength than one in fifteen hundred, and in most cases one in two thousand is strong enough for antiseptic purposes. Isolation of suspects and disinfection should be carried out. No person in attendance on the sick should have anything to do with the flock.

FIG. 42.—PAPILLATOME.

Sows, bitches, and cats are very liable to what are called "milk cancers," whether they have had milking troubles or not. They are not malignant and, unless their great growth causes them to come in contact with the ground and get wounded, seldom do any harm. If, for this reason or for appearance' sake, it is desired to remove them, they can be extirpated by a veterinary surgeon with no great difficulty.

If one were seeking to enforce the maxim that very serious consequences result from small causes, the teats might be referred to as examples.

The most common cause of injury is the traction of the calf upon the teat when already emptied. A full teat bears the compression and the pulling, but with more than usually thin-skinned animals the structure may be injured by the teeth, although distended. Fissures or ulcerated cracks are

FIG. 43.—MILK SUCKING PREVENTER.

thus set up, and from repetition of the cause there is every obstacle to healing. If the calf is taken away, there will be the necessary periodical milkings in which the granulations are repeatedly broken down by the hand of the milker.

When occurring near the point of the teat, the tissues between them and the canal are apt to get broken away, and a common sore blocks the passages.

Treatment.—The first and most important condition is one that is seldom attainable, namely, rest. In a few cases it may be consistent with the owner's convenience to dry off the cow, and nothing more than a simple dressing of alum one part, lard seven parts, will be needed, applied daily for two or three times. The calf should not be allowed to suck. The milk may be drawn by a syphon, only stripping the last few ounces by hand, and this should be oiled. The teat should be carefully washed with warm water and soap. Carbolic acid one part, and glycerine twenty, is an effectual application, but without very careful cleaning of the teat the milk is apt to be tainted, and the Pharmacopœia preparation of glycerine of alum is preferable. Deep cracks will be disposed to heal more quickly if the teat is first soaked in warm water and then the fissures dressed with a 10 per cent. solution of sulphate of zinc, but the body of the teat should be kept supple by lard or glycerine, or, better still, an ointment composed of seven grains of chinosol to each ounce of lard. These troublesome cracks first refuse to heal, and then are disposed to grow up so called proud flesh, which must be kept in check by the sulphate of zinc or other caustic astringent (*see also* Wounds and their Treatment). Eruptions upon the teat are generally due to some specific disease, as cow pox (which see).

BLACK SPOT.

Black incrustations, more particularly on the ends of the teats and blocking the orifices, are caused by the necrosis bacillus. They sometimes occur on the skin of the bag as well, and should be promptly scraped off and the raw surface painted with tincture of iodine. (*See* Digestion, Diseases of the Lips, &c.)

Lotions of most kinds intended to be used on the teats are conveniently applied as teat baths. A wide-mouthed bottle such as a one-ounce quinine bottle, or a larger one sold with pickles, may be brought to the teat, and the latter immersed and drained back again. By this simple method the greatest benefit is obtained and least expenditure entailed.

Warts upon the teat are a frequent source of trouble, and are apt to make cows difficult to milk (*see* Warts). The channel of the teat becomes blocked inside by thickenings induced by the calf or by blows, stings, and other external injuries. The lining membrane may thicken or have folds, or what practically amount to warts, inside, which interrupt the flow of milk; these are known to dairymen as "peas."

Treatment.—Warts of some varieties may be removable during the period of profit, but it will usually be best to wait for drying off, and then not forget them; which is what often happens.

Thickenings may be overcome in many cases by patient and judicious employment of the syphon, and where there is no actual injury or present pain a strong calf will often get a stiff teat into good working order. The practice of pushing up a red-hot wire is very barbarous, and not often successful in the end, as the sphincter muscles are so injured that the teat afterwards leaks or a fistulous opening results. A solid gutta percha or celluloid probe in the teat between milking hours will, in some cases, establish a convenient channel. It is important to properly disinfect instruments of the kind every time they are used, for it is from them that garget arises more often than from the original obstruction (*see* Garget).

"Peas," as they are called, inside the channel vary in their formation and attachment, but frequently have a narrow neck and can be cut off. They are merely warts on the membrane, and it is their situation that makes them so serious. The method of operation is with an instrument called a papillatome, but in the absence of this, one may succeed with a rather large

size milk syphon with one side filed away, leaving a cutting edge. This must be boiled to render it aseptic and then introduced with care, until the sharp edge comes in contact with the pea. With good fingers to feel and compress the teat with the left hand, the right may be employed in turning the syphon in such a manner as to cut off the little tumour and if possible "milk" it out. Like warts outside, they have a tendency to grow larger as well as to disappear, and the difficulty is sometimes overcome by merely pushing them back out of the way during milking with a syphon. The little operation described is generally successful, and, provided the instrument is sterilised, no ill effects should follow.

Injuries from barbed wire and other things which lay open a teat are often difficult to cure, so long as the animal is in milk, but have a disposition to mend when lactation ceases. The lips of the wound should be drawn together with fine sutures, and the syphon introduced at once. The difficulty consists not in the indisposition to heal so much as the filling and distension of the teat, and risk of garget of the quarter. If the passage can be kept clear, the worst of wounds will generally heal (*see* Wounds).

In heifers and some cows of irritable temperament, dressing the wound frequently presents much difficulty, and a preparation in the nature of a varnish will be most convenient to use, as requiring fewer applications. Equal parts of glycerine and friar's balsam may be recommended for the purpose, a small brush being used to apply it, or one part pure carbolic acid to fifteen parts of collodion.

Chapter X.

TROUBLES OF THE NEW-BORN.

In the previous chapter we have considered some of the farmer's difficulties in connection with breeding and the birth of the young—the troubles of maternity: now we may glance at a few of those which beset the newcomer, who may be "dead before he was born," or only apparently so, and capable of being launched upon an independent or separate existence with a little assistance from the accoucheur.

Many a disappointment to the breeder has arisen from suffocation in the fœtal membranes after safe delivery of the mother. The studsman has spent many wakeful and anxious nights in order to be at hand during foaling of a valuable mare, and in his absence for ten minutes the event has occurred, and the foal has been found dead on his return. The young creature of every species needs to be quickly freed from the envelopes. In the wild state, instinct teaches mothers to break away the umbilical cord by their movements or with their teeth and to assist the youngster to free himself from his trammels, but with the larger domesticated animals the loss of freedom has resulted in diminished care for their offspring. Mares and cows left unattended may fatally injure their young by treading upon them. Only a few sows avoid crushing young pigs in lying down. Bitches, cats, rabbits, and other animals are often guilty of devouring their young.

SUSPENDED ANIMATION.

My own experience leads to the conclusion that many young creatures are thought to be dead, and do subsequently die, because no effort is made to "wake up" the new-born, whose life-spring has been suddenly dammed before respiration has been established. Breathing is started by reflex

action, and it is necessary that the skin should receive a shock from the dry or cold outer air, which is communicated to the brain, and from the brain to the muscles of respiration, which in turn cause the inflation of the lungs. The calf dropped in the field comes to himself quicker than he that is born in a warm house. After a difficult delivery, when the umbilical cord has been twisted or pressed upon and the life-stream more or less dammed, the youngster appears to be dead, and those standing by will assert that he is so, unless they have had a good deal of experience. It then happens that he is cast aside, with perhaps membranes over his mouth, or the latter full of mucus; thrown upon a dung heap, or left in a corner of the building with head doubled up, while attention is given to the mother. This should not be. No foal or calf, lamb or pig, should be given up as dead until he has been exposed to cold air, slapped and whisped, his mouth cleared, his nostrils blown into, and his fore limbs moved in a manner calculated to induce artificial respiration. Quite a considerable time will elapse in some cases, when a slight jerking movement indicates an effort on nature's part to establish respiration. This should be sedulously encouraged by the means above referred to, but not by introducing stimulants, which oftener than not go the "wrong way" and decide the fate of the animal.

The methods advised for the treatment of the apparently drowned apply here.

THE FIRST SUCK.

Many youngsters are lost from failure to get the first mouthful of milk. The mare or other mother may be young and impatient herself, have a hard bag, or be merely "ticklish," and object to the approach of her offspring. It is for the experienced to overcome these difficulties by holding up the youngsters, "chirruping" to the dam, and establishing confidence between them. If the foal or calf gets one mouthful it seldom fails afterwards, although it may spend much time in awkward efforts to obtain the natural aliment. There is a gratifying sensation experienced by mothers who can express their feelings in words when the offspring succeeds in drawing the milk, and this soon cements the bonds between animals and their young. It should, therefore, be deemed an imperative duty on the part of attendants to see that the new-born use the teat. In the case of sows and of bitches with large litters, care should be taken to put the weakest upon the best deals, until their claim is established, as each pig or pup will become attached to a particular teat and keep to it. It commonly happens that the strongest secures the most forward and best deal on a sow, and the "weakest goes to the wall." The cottager with one sow generally raises a bigger farrow than other people, because of the early attention and constant care he takes in these matters. While one would not advise bringing up too many youngsters, it is very much a matter of feeding and management. If a sow or bitch is well fed from the first, she can and will produce more milk and for longer than if fed in the usual way, and allowed to convert her own substance into milk. There is no economy in this too common practice. A well-fed mother will bring up more young, which will be of greater value than the additional food expended on her, besides the time gained in coming in season in good condition.

During the first day or two of life the feet of foals are sometimes permanently injured. The soft yellow horn may receive impressions from uneven floors which take a long time to grow out, if the foot is not given a permanent inclination to one side. It is quite a mistake to pare off these loose fibres as is done in some countries: the proper course is for them to shrink and harden by evaporation, while walking about on hard and level surfaces.

CONSTIPATION IN THE NEW-BORN.

The new-born should be kept under observation until the attendant is assured that the bowels have acted as well as urine has been passed. A difficulty is often experienced, and it has to be remembered that even such simple functions have to be learned, and the tottering ungainly foal or awkward calf makes ineffectual postures and not infrequently tumbles over in trying to arch the back and set the diaphragm as a preliminary to exerting the greatest expulsive force. During fœtal life a more or less hard yellow mass accumulates in the rectum. Nature provides a natural aperient in the first milk. The colostrom or beastlings are intended to gently lax the bowels. If a mare has no milk or a calf is taken straight away from the cow as soon as dropped, the new-born fails to get this necessary aperient, and many cases of subsequent scour as well as primary constipation result. In any case where the normal effort fails to pass the first dung, we should be prepared to render assistance with an oiled finger, or soap enema at about the temperature of the body. It is very little help that is needed, but most important to give it. If we know that the natural aperient is wanting, as in the cases above supposed, we should give a dose of castor oil in warm milk proportioned to the size and breed of animal. (*See* Scours.)

TROUBLES OF THE NEW-BORN.

We get so accustomed in the milk business to look upon this product as created for distribution, for butter making and for household use, as almost to forget its real purpose in the scheme of creation.

Preparation for milk making is begun before the period of parturition arrives, but there are some individuals in which there is delay—fatal delay in a few instances. The milk may, on the other hand, be a little "too previous" and burden the mother before she has any offspring to suckle. These opposite cases serve to prevent us from laying down hard and fast rules about milking before calving, as every cow should be treated according to her needs and with intelligent observation of her case. Before parturition there is usually a thin fluid, resembling serum as much as it does milk, which can be pressed from the teat. The udder at this time pits on pressure like an œdematous or swelled leg, but changes as the gland structure increases in volume, becomes firmer, denser, and more sensitive as the amount of blood circulating within it increases. The udder is more or less suddenly brought into full power, and the quantity of milk secretion attains a maximum. While these outward and visible changes are going on, the nature of the secretion is rapidly changing. The first day and the fourth will produce quite a different kind of fluid. The thick yellowish fluid known as colostrum is of greater specific gravity than ordinary milk: in the cow, about 1·063.

THE MOTHER'S MILK.

In solids it is rich, but varying much in different breeds as well as in individuals. The colostrum corpuscles may be easily distinguished with a moderate power microscope from the fat globules, which at this period are few in number relatively to the spherical or leucocytes; the latter being endowed with the power of movement. According to Dumas, the colostrum of various animals consists of water, fat, albumen, mucus, sugar, in the following proportions :—

	Cow.	Ass.	Goat.
Water	803·3	828·4	641·0
Fat	26·0	5·6	52·0
Albumen	150·7	116·0	215·0
Mucus	20·0	7·0	30·0
Sugar	traces	43·0	32·0

If the composition of this is compared with milk at a later period it will be seen how entirely unfitted is the stale milker for a calf taken away from his mother as soon as dropped. Yet this custom is quite common. What can we expect but indigestion, manifested by diarrhœa? It is not to a bottle of medicine we are to look for the remedy, but to as close an adherence to nature's laws as circumstances will permit. The success of a dose of castor oil given to a calf with the skit is due to its belated substitution for the colostrum. With the first milk—that of the first two or three days, we mean—the youngster's bowels would have been gently opened and the way prepared for digestion of the rich but no longer aperient milk of the mother. From the fourth or fifth day, again, varying in individuals, the colostrum gives place to milk of an average specific gravity—in the cow of about 1030: in human milk, 1020: ewe's, 1035: ass's, 1019. The foregoing figure for cows is what we ought to expect, but it often reaches 1040 in the best class of cattle. The essential parts are water, butter, and casein. Albumen, milk sugar, and a small proportion of mineral matter are also present (phosphates of lime and magnesia, carbonates, &c.). An interesting comparison of milks is offered by the following table:—

Constituents.	Woman.	Cow.	Goat.	Sheep.	Lhama.	Ass.	Mare.
Water	87·38	87·60	87·30	81·30	86·60	89·63	91·37
Fat	3·80	2·20	4·40	7·50	3·10	1·50	0·55
Casein	0·34	3·00	3·50	4·00	3·00	0·60	0·78
Albumen	1·30	1·20	1·35	1·70	0·90	1·35	1·40
Sugar	7·00	4·70	3·10	4·30	5·60	6·40	5·50
Salts	0·18	0·70	0·35	0·90	0·80	0·32	0·40

It will be seen that the cow whose milk Doyère examined would not pass muster under the Dairies Act, but she is more representative of the fluid distributed in towns under the name of milk than retailers would be willing to admit: besides, this was not English milk, and there are still a few things we can make as well here as abroad. The special point I have in mind is the great difference between the milk the new-born ought to have and what they get when taken straight away and sold from one to another at market, arriving at their final destination tired and worried and so hungry as to fill themselves with quite unsuitable food. The milk of the same cow varies all the way. First the colostrum, as we have said: then the flush of good milk which contains the most suitable proportions for the building up of the calf. During the first three months, or say the first third of the period of lactation, the salts are most abundant. They contribute to bone building. Analyses conducted on a thousand parts of ash by Haidlen and Fürstenberg showed 475 of phosphate of lime, magnesia, and iron; 219 carbonate of lime and salts which were more especially combined with the casein; 343 of sodium salts, with traces of sulphur and fluoride of calcium. A cow that has calved some time may, and usually does, give milk richer because of being less diluted, but the proportions of the various constituents, including water, are not suited to the new comer. It is a matter of common knowledge that calves are put to all sorts of cows and only the minority fail and scour, but a sufficient number do so to spoil the profits on bought calves unless the purchaser is very lucky. It is when we come to the substitution of the milk of another species of animal that we most often break down. The infant can take pretty well to cow's milk because it is so nearly like its mother's milk if we add a third more sugar. If the composition of ewe and goat's milk is compared we shall easily account for the successful rearing of Kurghese and other northern Asiatics, who depend on flocks for milk and cheese as well as for meat, food, and clothing. Mare's milk is the most watery and contains the least fat. If then we would rear a foal by hand or assist his development, we must imitate

the mother's milk. If we add to cow's milk about one third of water we reduce the relative proportion of fat but rob it of sugar, as the mare has naturally 5·50 of sugar to the 4·70 of the cow. We must then add sugar to balance it. The present writer has reared several orphans from their birth which was the death day of their dams and found the following proportions successful, neither of my foals looking back or becoming pen-feathered and humpy. First a dose of castor oil in warm heifer's milk: then three parts milk from a fresh calver: preferably a heifer of the shorthorn or cross breeds, and certainly not a rich Jersey, one part hot water: one-fortieth part milk sugar or cane sugar and one-hundredth part lime water. A pint is a convenient quantity to make at a time, and we should never overload a hand-reared animal, but rather let hunger lead him to find us. Roughly and near enough for our purpose will be three quarters of a pint of milk fresh drawn: five ounces (a gill) of hot water (hot in order to bring up the temperature of the whole to that of the foal), half an ounce of sugar of milk or of cane sugar: one teaspoonful of lime water. A mathematician would find fault with these figures, and our excuse is that the analyses are borrowed from others, but the experience is our own.

If you want to hob a lamb on cow's milk, and have not a goat, you have to take into consideration the disproportion in fat chiefly, the ewe's milk containing more than double that of the cow. You won't get the butter maker to spare you any milk or cream from a Jersey, and must make up fat in other ways. If separated milk or an inadequate supply of other milk is obtainable, it may be supplemented as for calves. The proportions recommended by the Board of Agriculture in Leaflet No. 142 can be relied on as the result of long experience, and should be in the possession of every farmer and stockbreeder.

LEAKING NAVEL; PERVIOUS URACHUS.

During the life *in utero* there is a canal connecting the bladder to the umbilicus, through which the urine passes. At birth its office ceases, and a passage is established through the penis or vagina, according to the sex. In the usual way the original channel is blocked up, becomes a solid cord, in fact, and shrinks to very small dimensions. It sometimes happens that this closing is imperfect: the walls have been strained or injured, and the urine continues to escape by drops, or trickles, although the new canal is doing its duty. It is of more frequent occurrence in horses, asses, and mules than in other species of animals.

Treatment.—If nature does not complete the work in a few days (a very frequent experience when no interference takes place), it should be first ascertained that the urine passage is open, when it will be safe to place a ligature upon the extruding portion of umbilicus. It is generally prominent where interference is required, and, if not, the parts can be lifted with a stout curved needle, in order to tie a moderately tight waxed end or small soft twine around it. It should not be drawn so tight as at once to strangle and cause sloughing of the parts, but should exercise such gentle compression as to set up a mild form of inflammatory action which results in adhesion. A figure of eight may be wound round two cross needles pushed through the skin with a margin on each side of the umbilicus, if the operator is fearful of doing injury, as this can be unwound and examined if sloughing is feared, when it may be slackened or tightened as required. Where operative measures do not appear practicable, the end may be accomplished by a blister which causes swelling and consequent pressure on the parts. Sulphate of copper (blue stone) is also employed to touch up the soft tissues, which shrink under its influence.

ENLARGED NAVEL, RUPTURED NAVEL, UMBILICAL HERNIA.

Foals and puppies are the most frequent subjects of this defect, and it is common in particular districts, as in the mule-breeding parts of France and the southern States of America. The opening which served the fœtus *in utero* should close soon after birth by the contraction of the gelatinous material of which the cord is chiefly composed (with the blood-vessels contained in it, and the urachus) *see* Leaking Navel above.

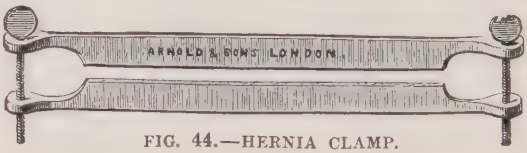


FIG. 44.—HERNIA CLAMP.

The deformity is known as umbilical hernia or navel rupture, whereby a portion of the viscera protrudes through the unclosed belly of the young and appears as a tumour. After a period of fasting the animal can be best examined. It should be secured on its back while we feel the lump, ascertaining with how great facility we can put it back, or whether it is partly resistant only. Generally speaking, it is easily pushed back into the abdomen, and as quickly returns when our finger pressure is withdrawn. Having satisfied ourselves that it can be replaced in its proper position, we have next to decide the important question of what is inside the skin. Squeezing it laterally will often enable us to decide. If it is omentum or folds of the peritoneum, it will feel doughy and about equally compressible, but on the whole rather hard. If it is gut, it will be compressed easily as a sausage skin, and we can feel that we are squeezing out the intestinal gas which chiefly occupies it.

One must be very heavy-fisted if one cannot differentiate between a tumour consisting wholly of omentum or wholly of intestine; the difficulty comes in where it is composed of both. Then the practised hand is necessary before any operation is undertaken. In such case the mass feels unequal in composition, and one side or portion softer than the other. Before releasing the subject, we should ascertain with our fingers whether we can pinch up the skin free of the contents of the tumour and still press back the latter into the belly. If we can do this our fears are practically dispelled, because any treatment we may adopt to reduce the hernia will succeed as well for gut as omentum, provided we do not wound the former.

We may well consider whether to wait for reduction of the hernia by natural processes or proceed to operate. It should be understood that the portion of gut that protrudes—if gut it is—is the small one, which, during the sucking period, is situated upon the floor of the abdomen, but that this is withdrawn when the youngster feeds after the manner of adults. It then goes into the right flank, and the large bowel rests on the bottom of the cavity, and by reason of its size is much less prone to escape through a small opening such as the navel. The closure, too, has been going on to a greater or less extent during the summer months.

In the case of ruptured foals, then, it is seldom worth while to interfere during the first few months. If the lump at the navel has not been drawn in, and practically disappeared in the following spring, it should receive attention. It is not of so great importance in other stock, and unless it enlarges, or shows signs of tenderness, or some complication is feared, it may be left for a time, in the hope of a natural cure taking place. The rash and inexperienced may mistake this lump for an abscess, and puncture it with fatal

consequences. There is really no excuse for such error, as there is no tenderness to speak of in the hernia, whereas the mattering abscess is very much so, and the animal shrinks from pressure applied. The swelling feels hot and inflamed, which is not the case in rupture.

The autumn is the best period for treatment. Time has been allowed for natural cure. Flies are going, and the animal is better able to bear an operation. There are four methods of treatment: (1) Bandaging; (2) topical applications; (3) constriction; (4) operation for complications. The pressure of a pad of lint under any sort of appliance that can be kept in place will in most cases succeed, but keeping it in place is just the difficulty, as the change of posture when lying down or curled round slackens one part and tightens another. Mr. Armitage invented a truss which has long been held in repute. A handy man may build up such a contrivance out of materials in the farmhouse. A cushion stuffed with horsehair makes a good pad, as it will bear a good deal of compression without risk of galling. Besides the objection already mentioned, the adoption of any sort of truss necessitates at least a month's supervision, and more likely three, before the natural adhesive processes have closed the aperture in the belly.

As long ago as the second century of the Christian era, Celsus wrote in favour of sulphuric acid, and this and other powerful escharotics have been employed by farriers with a large measure of success. A glass rod dipped in the vitriol (sulphuric acid) is drawn across the tumour every two or three days, or touched at spots all over it. A somewhat violent effect is produced upon the surface of the skin, and is followed by an infiltration of serum or accumulation of fluid within the meshes of the connective tissue or fascia, and a plastic exudation in the hernial sac itself, so that the extruded viscera is pushed back into the abdomen. Subsequent permanent contraction retains the lump within, and the umbilical opening is sealed up by the products of the inflammation excited by this drastic remedy. Nitric acid is used by some.

Constriction is practised by pinching up as much skin as possible between finger and thumb, and applying a clamp. The writer has found those made of aluminium the best, but they are expensive. Whatever clamp or "clam" is used, it should be applied sufficiently tight to press hard upon the tissues, but not so fiercely as to cut them asunder. In the absence of a suitable instrument, a tight ligature may be put on, as we should do for a large wart. Perhaps the best of all the old methods is that of two wooden skewers run transversely through the tumour, and then with twine making a figure of 8, that at once keeps the skewers in place, and affords equable pressure. The *modus operandi* is again the same. The injury inflicted causes an inflammatory action which produces new material, first to push in the viscera, and next to bind over the breach. The tissues within the grasp of the clamps, or included in the ligature, however secured, eventually die and are cast off, leaving a strong cicatrix or scar. When first sloughed, there may be a granulating red raw surface which will benefit by a touch of caustic, and should be encouraged to dry off, and not receive fomentations, which only promote the growth of proud flesh.

Operation is necessary when gut is present, or gut and omentum both, and we are unable to lift enough skin or detach it or ligature or otherwise carry out the treatment above described. Fasting is the proper preparation, and the animal should be put on his back and securely held. Chloroform is of great assistance in these cases, but not essential. The parts are washed with an antiseptic, the skin cut through with the edge of the knife always held upwards, the connective tissue separated stitch by stitch, so to speak, for fear of wounding the bowel, until the contents of the sac can be clearly

made out, and disentangled if needs be. They are then put into the abdomen, and the gap in the belly stitched across and across with soluble sutures, after the manner of a good stocking mender with a large hole to deal with. These stitches take a deep hold upon the vellum, and the stitches are left in. The skin is then sewn over the now temporarily closed gap, and should be pulled up as far as it will stretch, and sewn through from side to side as a tailor would sew a sleeve. The inner network of stitches will almost always prove enough, but the sewn skin is a second line of defence, and its contraction a permanent source of strength.

NAVEL ILL, OR INFLAMMATION OF THE NAVEL STRING.

This must be distinguished from the previously described troubles of the structure in question and is a very serious matter, frequently causing death. The vein is the chief source of inflammatory mischief, and extends backwards as far as the liver, with a disposition to form clots which may entirely block it, or be carried away into the lungs and set up centres of inflammation. This blocking of veins is known as embolism, and may occur in any part of the body, and, in the disease under consideration, usually carries with it some septic infection which leads to fatal consequences.

The early symptoms often go unnoticed, and only when the animal is found constantly on the ground and indifferent to the teat is the swelling of the navel observed. Instead of drying off and withering in a few days as it should, it presents a large soft mass from which flows an unhealthy discharge. A high degree of fever follows, rapid breathing, sunken eyes, dry hot mouth, constipation, or else diarrhœa, diminished urine, and a discoloration of the mucous membranes suggestive of jaundice. The cause is a specific organism acquired by contact with deleterious matter on dirty ground or soiled floors, and the malady is more common where birth takes place in buildings than in the open field. Prevention is to be sought in early dressing of the navel with suitable antiseptics (*see* Navel Treatment, *also* White Skit and Joint-Ill), and good sanitation generally.

Treatment should be directed to neutralising the effects of the poison, for such it is, by syringing into the cord a 5 per cent. solution of carbolic acid or 6 grains of perchloride of mercury dissolved in six ounces of water, or of chinosol twice daily in the case of foals and calves, and for lambs and puppies substituting salicylate of soda, or borax, or alum of the same strength. All around the navel should be dressed with an ointment containing one of the above substances, and in the same proportion. Salicylate of soda, quinine, and tonics generally may be given when the disease has become constitutional (*see* Table of Doses).

TONGUE-TIE.

Calves and other animals are occasionally unable to obtain sufficient milk owing to the shortness of the frænum or "bridle" which restrains the tongue. When this is detected it should be cut, as there is no danger in so doing, and the relief is immediate. The wound heals without treatment.

Chapter XI.

SKIN DISEASES.

Animals suffer from many skin diseases, some of which are due to particular states of the blood in which excretion of irritating matters excites local inflammations; some are specific eruptions, accompanying diseases, such as horse, cow, or sheep pox; and others are traceable to the presence of external parasites.

Too little importance is attached to skin irritations by the majority of men having charge of stock, and what might at first be arrested by a rub from a paraffin rag, or a smear of sheep ointment, afterwards becomes so virulent as to cause the death of many horses and sheep.

ITCHING.

The most common symptom of skin diseases is itching, and its proof scratching and rubbing. There may be redness without itching, or itching without redness, but the two are in frequent association. With horses, cattle, sheep, and pigs the diseases of the skin are not difficult of diagnosis; they can be decided upon and treated with all but invariable success, but in the case of dogs there is often an annoying amount of irritation traceable to no definite cause and amenable to no treatment—a constant itching, which makes them a nuisance to themselves and everyone with whom they are associated.

When an animal is seen to rub, scratch, or "dig," as our West-country friends have it, an examination should be made, and if nothing of a definite character is discernible the owner will be on the safe side if he assumes it is parasitic, and applies some well-proved destroyer, as tar and sulphur, or carbolic or creosote emulsions, or mercurial ointment. The subject may wait for expert advice until a more convenient time, if the above precaution is taken.

HORSE POX, COW POX, SHEEP POX.—THE POCK, VACCINIA.

Of much importance to the farmer and to the world of men and women are those eruptive specific diseases classed as variola, because related to the practice of vaccination and arousing all the combative instincts of civilised communities in advocating or resisting inoculation for prophylactic purposes. Into the controversy it is unnecessary for us to enter: the author's business is to convey such information as he possesses on diseases of animals and their treatment.

Horse Pox (Variola equina) is an eruptive disease seldom seen, Cow Pox (Variola vaccina) not uncommon, but less so than formerly. From this variety Jenner is believed to have obtained his lymph, but opponents of vaccination prefer to regard the horse as the original subject from which the virus was taken, and some assert that the disease was grease and not variola. At the present time the lymph is obtained from calves which are carefully examined and kept under observation before and during the manifestation of the disease induced by inoculation.

Sheep Pox (Variola ovina) is one of the scheduled infectious diseases, and similar in character to the pox of cattle and horses. The eruption favours

certain situations in the different species of animals. In the horse, " various parts of the body " ; in the cow, chiefly upon the udder and teats ; and in the sheep, upon the thighs and under the forearms.

Whether in man or animals, the variolæ are infectious, and have a more or less constant period of incubation. The eruptions are of the same character and undergo like changes. First a pimple or papulation, then its contents changing to a watery or slightly milky fluid (vesication), then a further alteration of the contents to pus (pustulation), and, if not broken by outside interference, desquamation or peeling, and resolution or healing. If broken, as commonly happens with milking cows, a ragged ulcer is left, and gives some trouble, owing to the renewed injury it receives at each milking.

From the farmer's point of view only sheep pox is of very great importance ; the others do not bring the police inspector and draw a cordon around the farm as with swine fever or foot and mouth disease. The great town milk-sellers will require notice to be given of cow pox, and rightly object to receive milk from cows with any suspicion of disease, of however benign a type.

Treatment.—Good hygienic conditions are the chief consideration ; the mild attack of fever goes through a certain course with or without interference. Affected cows should be separated from the herd, and a man told off to milk and attend to them who has nothing to do with the others. The milk may be given to pigs with safety. If any medicine is given at all, it should consist of salines, as three-quarters of a pound of salts and an ounce of bicarbonate of potash, or an ounce of the latter daily in the drinking water. The eruptions should be bathed twice a day with a mild antiseptic, as borax 5 per cent., glycerine 10 per cent., water to 100 per cent. If dry crusts and cracks are disposed to form, an ointment of lard containing 10 per cent. of boracic acid or 2 per cent. of chinosol may be used in lieu of the lotion above.

Sheep pox must be notified to the police, but is happily very rare in the British Islands.

ECZEMA.

There are a number of eruptive skin diseases grouped under the above term. It applies to any skin affection which comes up as a little bladder containing a thin watery fluid which undergoes changes, breaks, and forms a confluent sore. It is different from the pocks, inasmuch as it comes in discrete patches, passes through its stages very rapidly, and does not leave pits or ulcers. The bladders are commonly very minute, and, more often than not, broken into one another before the trouble is observed. The size of the vesicles, too, bear some relation to the species and size of animal. Cattle will break out on the skin under the thighs and forearms with bladders as big as peas or even larger, while on the dog and cat the vesicles are so small as to require a magnifier to clearly show them.

Eczema in horses is often mistaken for mange, while a chronic form of eczema in dogs is known to the kennel man as " red mange." (For the latter *see* Mange.)

Causes.—The presence of some substance in the blood which, in course of elimination through the skin, sets up inflammatory action, is an explanation offered. Indigestion, giving rise to such changes in the blood, or producing ferments. There is a fair amount of evidence for these conclusions, as the introduction of some faulty food will be followed by an outbreak of eczema among a considerable number of animals, and successive beasts will be attacked while its use continues. Such observations have been repeatedly made as to horses, cattle, sheep, pigs, dogs, and cats.

Treatment.—Remove the cause. Give small doses of salts repeated several times (*see* Table of Doses), dress the sore patches with simple ointment, or lard containing five grains to the ounce of chinosol, or ten grains of boracic acid, or use a lotion of similar composition. It may be advisable to vary the treatment with bicarbonates of potash or soda, or to give arsenic in small doses over an extended period, when eczema takes on a more or less chronic form.

Horses and dogs will commonly be benefited by a more drastic purge—aloes for the horse, and jalap for the dog—before commencing the salines usually recommended. Some trouble may be saved by giving dogs and cats the solution of magnesia in their food and water; it is practically tasteless.

MALLENDERS AND SALLENDERS.

These eruptions, occurring at the back of the knees and front of the hocks respectively, are eczematous, a sub-acute or chronic irritation occurring in these flexures of the skin. Although to be found in all breeds of horses, the thick "gummy" legged ones are the most prone. First an inflamed and more or less swollen skin is followed by an eruption and a crack; an ulcer forming as a long crack behind the knee, or in front of the hock.

Treatment.—This should be aimed at getting any cracks healed and a healthy secretion established, rather than any attempt to too quickly arrest all exudation. There is a disposition in some horses to thrush if mallenders are too quickly healed, or to breakings-out of other kinds. Occasional diuretic balls or bi-weekly mashes containing nitre and sulphur should be given, and the parts dressed with oxide of zinc ointment containing fifteen drops of carbolic acid to each ounce.

A very satisfactory ointment for chronic cases may be made by mixing twenty grains of finely triturated red precipitate powder, with forty grains of burnt alum, and one ounce of vaseline, applied two or three times a week after sponging clear of accumulated scales and matter. If a lotion is preferred, the same proportion of carbolic may be used with one drachm of glycerine in each ounce of water. Apply night and morning.

GREASE: ECZEMA IMPETIGINODES, OR PUSTULOSUM.

The offensive skin disease of horses, commonly known by the name of grease, is a chronic form of eczema complicated by structural changes and presenting semi-globular masses in some instances, which are recognised as grapes from their distant resemblance to that fruit—in appearance only.

It is not so common a disease as formerly, when more underbred round-legged and gummy-limbed animals were bred. It is, however, much too prevalent in the cart stable yet, and while largely hereditary is to no small extent due to preventable causes.

These are: standing in dirt and manure, thrush and canker extending to the skin and creating a condition of irritation, washing and putting away wet.

Farm horses with soil adhering to their feathered legs should not be washed but put away with the dirt on them. When dry it will easily be broken up and brushed out. The practice of watering in ponds also adds to the number of cases of grease and cracked heel, but the labour it saves will always be an inducement to follow the time-honoured custom.

The first symptom of stamping and rubbing one leg against the other is too often disregarded. The next is standing up of the coarse hairs and a discharge of a yellow oily nature oozing from the skin, running down the leg

and scabbing as it goes. Cracks follow in the hollow of the heel and upon the back surface of the pastern and fetlock from which a particularly foul-smelling discharge emanates. The odour of grease is always repulsive in the extreme, and becomes worse as the disease advances. (*See* Leg Mange.)

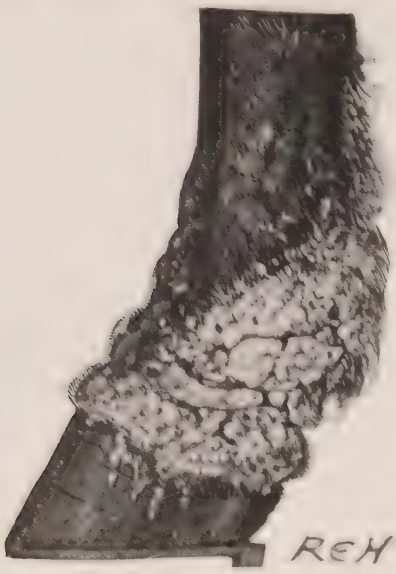


FIG. 45. CONFIRMED GREASE.

Treatment.—This should be early to be effectual. A bucket of lotion should be made by dissolving a pound of common sulphate of zinc in two gallons of soft water, and after picking out the dirt from the hoof the leg should be held in this lotion for several minutes to ensure action on the skin. A clipped or fine-bred horse may have it applied on a sponge or soft rag; but without some trouble the lotion never reaches the affected parts, but runs off like water from a duck's back, and of course does no good. Better even to wash with warm water as a preparatory measure than to employ the lotion in such a way as to fail of its object. The zinc sulphate is recommended because it does not discolour a white leg, but a mixture of zinc and copper sulphate is perhaps better still where dark legs are concerned.

A 5 per cent. lotion of chloride of zinc is also an excellent deterrent of grease, especially when grapes are disposed to form, and may then be used of double strength. An excellent remedy, if the hair is clipped close to ensure contact, is the Pharmacopœia solution of perchloride of mercury. It has to be rubbed in for several minutes nightly. Captain Gibson of Swaleeliffe used it with great success. A stronger lotion with a great reputation is made by dissolving thirty grains of the perchloride in eight ounces of methylated spirit of wine. This serves without so much rubbing in. A 5 per cent. solution of formalin in water is another remedy much favoured in heavy studs. It is well to change the remedy from time to time if the best results are to be obtained. Having regard to the hereditary and constitutional character of grease, we should invariably treat it with internal remedies as well an occasional dose of physic, and, during the continuance of the eruption, daily doses of the mineral tonics and diuretics (*see* Diuretic Balls). These substances may most of them be given in powders in the food previously damped, or in a little mash with spices or salt to make them attractive. One of the most effective agents for the suppression of chronic grease is arsenic, which may be given in doses of five to ten grains daily with above remedies and gradually increased if necessary. The objection to its use is that the arsenic habit, once acquired, must be persisted in, or the animal loses condition and goes back rapidly. The discontinuance of this drug is often the reason of disappointment on the part of purchasers of horses which had a fine bloom on them at the time of changing hands. (*See* recipe for arsenic solution under Canker of the Foot.)

Two to four-ounce doses of Epsom salts, with an ounce of nitre and two ounces of sulphur, once or twice a week, for a heavy horse constitutionally disposed to grease, will do very much to prevent its occurrence as well as to cure it.

Grapes.—When this stage has been reached it is necessary to resort to extreme measures and burn off the excrescences with a fire shovel made red hot. The animal may be saved much pain by a previous liberal dressing of a 10 per cent. solution of cocaine. A rapid destroyer of morbid tissues is also found in a saturated solution of chloride of zinc or in the caustic sticks of zinc themselves applied to the soft moist surface of the grapes, and in a 10 per cent. solution of formalin. If persisted in these remedies will keep in check the very worst of cases.

MUD FEVER: ERYTHEMA.

The inflamed condition of the skin where mud has adhered is known as mud fever, and in some seasons it is a suitable description, since a high temperature accompanies severe attacks.

When a thaw comes suddenly after a hard frost, the mud thrown up on the legs, thighs, inside the forearms, and along the belly is sticky, and causes irritation. Some chalky soils are especially notable for this, but mud fever may occur on any soil and without frost. There are many horsemen who believe that the disease comes from within—is, in fact, an eruption of the nature of eczema, but pathologists class it as an erythema or reddening and inflammation due to irritating properties in the mud. In 1871 there was an epizootic of it, and many horses in London and other large cities died from its effects. Patches of the superficial layer of the skin come off in ordinary attacks, but occasionally erysipelas supervenes. There is no mistaking the complaint, as the demarcation is clear; it only comes where mud has been.

Treatment.—Prevention is to be tried by not washing the legs, but allowing the mud to dry, and brushing it off later, or even next morning. It was found, in the great outbreak previously alluded to, that the well-washed gentleman's horse was the worst sufferer, and the night cabber, put away dirty, the least liable, and this circumstance being recorded, led to the adoption of the plan here recommended. If a horse is known to be subject to mud fever, he may have a dressing on the most exposed parts before going out consisting of strong solution of diacetate of lead one part and linseed oil twenty parts. When attacked, the swollen and painful parts should be fomented with warm water containing 1 per cent. of Jeyes' Fluid and 5 per cent. of glycerine to soft water, followed by a lead lotion with fuller's earth in suspension and well shaken at time of using—sugar of lead half ounce, fuller's earth two ounces, water forty ounces. This may be applied several times daily. The legs should not be bandaged or covered in any way. Internal cooling medicines should be given, preferably Epsom salts and bicarbonate of potash in small and frequent doses (*see* Table of Doses).

Gentle exercise after the first acute symptoms have passed.

Bran mashes, carrots, and generally cooling and nourishing diet, and gradual return to ordinary food and work are advised.

NETTLE RASH. URTICARIA. SURFEIT. BLAINE.

The sudden eruption of a number of round or oblong elastic eminences upon the skin of the horse is recognised as nettle rash, but by no means confined to that species—cattle, dogs, and swine being also subject to it. The remarkable suddenness of their appearance may well have suggested the stinging of nettles or other plants in the first instance, but we know that the urticariæ have nothing to do with it nowadays. A sleek skin, apparently denoting perfect health, may in the course of a few minutes be covered with eminences varying from the size of a hemp seed to a broad bean, and disappear again as rapidly in some cases.

It is thought to be due to digestive disturbances, and occurs on all sorts of diet, from hard corn to grass, and has been noticed to come up within a few minutes of a deep draught of cold water, when heated by work.

Treatment.—In those cases which give rise to itching and more or less constitutional disturbance, it is well to give a purgative dose (*see* Physic at page 270), and prescribe a cooling lotion, as half an ounce of sugar of lead to a quart of cold water, and wineglass of vinegar. Some alterative powders (page 295) for horses or salines for other animals may be given if the trouble does not quickly pass away. It is important in the case of horses to get rid of it quickly, as the hairs are disposed to come white where the bumps have been, and this disfigurement depreciates value, particularly on dark-coloured animals.

HOWKES. BLAIN OR BLAINE IN CATTLE.

In the cow, especially when changing pastures or on the road, urticaria, or nettle rash, is often of an alarming character to those who have not seen it before and who would not associate it with nettle rash as seen in other species. The sudden and great swellings about the eyes, ears, neck, and around the root of the tail, suggest having been attacked by a swarm of bees or stinging by some still more venomous creatures. Foaming at the mouth and symptoms of choking appear in the worst cases; yet it is but a transient malady and yields quickly to such treatment as a half-gill of spirit of turpentine in a pint or more of linseed oil or milk.

If the symptoms do not immediately yield to this remedy an alkaline bicarbonate should be given every three or four hours, consisting of bicarbonate of potash or of hyposulphite of soda in a pint or more of water. A 10 per cent. dilution of glycerine in water as a local application will give comfort to the patient.

Animals should not be bled or the nostrils slit as is the custom of some northern drovers. The patient should be put in a quiet place, and not be asked to travel until the swellings have entirely subsided.

CRACKED OR CHAPPED HEELS, SPREYED SKIN, SCRATCHES.

By these and some other names the inflamed heel of the horse, with more or less separation or opening of the skin, is known to horsemen. The causes are various. Getting chilled by melting snow, continuous cold, rain, road grit deposited upon the tender integument, summer heat and dust filling up the pores of the heel—these are the more common causes; but there would appear to be hereditary predisposition in some horses, and it has been observed that white heels are more prone than dark ones. The heels of the horse are endowed with minute glands which secrete a soft unctuous material when in health. If a finger is rubbed over the smooth surface or the hairless portion here alluded to, and then wiped on a pocket-handkerchief or on clean paper, it will impart a greasy stain. This is the fine lubricant provided by nature to prevent friction when the leg is flexed and the heel and back of the fetlock approximate.

When by reason of any of the causes mentioned above these little glands are inflamed, the secretion is altered, it becomes turbid, irritating instead of soothing, and a crack follows on a tense inflamed condition of the skin, which at first produces lameness. In the morning, a horse so affected will "pull out" very lame, but with a little exercise the crack will open, a discharge flow, and relief be obtained—for the time only—for it will stick together again at night, and added inflammation may be expected from working under like conditions to those which brought about the trouble.

Treatment.—The reader who has followed the explanation offered above will see the propriety of at once poulticing a cracked heel in order to subdue

the inflammation and restore to the sebaceous glands their most important function. This done, we may treat the crack as an ordinary ulcer, and use such styptic and astringent remedies as sulphate of zinc, ten grains to the ounce of water, or, for a dark-heeled horse, a like strength of sulphate of copper or of nitrate of silver. If an ointment is preferred, and in many cases it is more desirable, twenty drops of carbolic acid may be rubbed down with one drachm of oxide of zinc and ten grains of sulphate of zinc in fine powder made into an unguent with one ounce of lard, free of salt. Many persons dry up a crack by a direct application of a crystal of sulphate of copper (bluestone) or of lunar caustic (nitrate of silver), but too much haste in healing is not desirable; fluids get imprisoned and cause the crack to reopen, and repeated applications of caustic leave a thickened and hard edge, which need not be the case if more slowly healed with granulations smaller, denser and more lasting.

The summer variety of cracked heel may not need any of the caustic agents, but simply dusting over with an antiseptic and soothing powder, after carefully washing clean of grit and wiping dry with a soft cloth. Such a powder may be used for many other raw surfaces.

Dusting Powder for wounds and chaps, cracked heel, &c.:—

Chinosol	3 parts.
Burnt alum	10 ,,
Oxide of zinc	15 ,,
Oaten flour	32 ,,

Scratches from barbed wire or other causes should be cleaned by fomentation with an antiseptic, or bandaged with carbolised oil. Imbedded thorns which are broken off and cannot easily be removed should be poulticed until they suppurate and make a way for themselves. Shaving the parts will sometimes enable one to seize a thorn, or the orifice may be judiciously enlarged to permit of its extraction.

BURNS, SCALDS, FROST-BITES.

The effects of intense heat or cold, whether as the result of fire, steam, or frost, are the same. Three degrees of injury are commonly recognised. (1) Those in which redness only is produced. (2) Such as induce blisters. (3) Those which cause death of the part injured. To the first category belong those simple burns, scalds, or touches of frost which give rise to superficial inflammation, terminating with the desquamation of more or less cuticle and hair, both of which may be renewed. The second class are marked by the familiar blister under which serum, and perhaps pus, forms. And the third by death of tissue, the parts being roasted or boiled, and the blood coagulated in the vessels, arresting circulation. Horses employed in factories, iron works, &c., are liable to burns and scalds; dogs and cats suffer often from what lawyers call "contributory negligence," particularly in getting into fire grates and suffering from falling cinders, and from lying in front of the fire when a kettle boils over, or is spilt in pouring out. Frost-bites affect the coronary bands of horses' feet in weather alternately snowing and thawing, and when salt has been put down on snow. Dogs' pads also suffer from the last-named abominable practice.

When death occurs it is from shock.

Treatment.—The injured part should be protected from the atmosphere as quickly as possible. In the absence of any other substance flour will probably be at hand, but every farm-house should possess a bottle of carron oil, which is made by shaking together equal parts of linseed oil and lime-water, than which no better dressing for burns and scalds can be recommended as a first aid. Alternate dredging with flour and pouring over of carron oil,

and over all a thick layer of cotton wool, may be tried, but any bandage must be light and adjusted with great care. Carbolised oil may be used as a change from carron oil, and is soothing, if not stronger than one part of acid in twenty of oil of olives or linseed. Whiting, mixed with water to the consistence of cream, or fuller's earth and olive oil, form comforting applications.

An ointment of one part of fine oxide of zinc and ten of vaseline has also been employed with advantage. Some patients derive more relief from alkaline solutions, as bicarbonate of soda 5 per cent., and others from a 10 per cent. lotion of glycerine and rose water. Cases which do not progress favourably and give forth foul discharges need to be treated with disinfectants, as 2 per cent. of chinosol with 10 of glycerine, and water, or some of the coal tar derivatives, as 2 per cent. creolin or phenyle solutions.

Collapse may be combated by stimulants, and pain eased by anodynes. (*See* Anodynes.)

STINGS AND BITES.

The stings or bites of insects are sufficiently annoying in themselves, but in the case of animals occasionally lead to serious accidents. Horses sometimes become unmanageable when tormented by hornets, wasps, blood flies, and other insects, while several cases are on record where animals have been stung to death by the attacks of infuriated bees. Many of the accidents which follow on dislocation of the bridle are primarily caused by the annoyance of stinging or biting insects.

Whether by biting or by the insertion of a sting, the poison introduced causes suffering more or less prolonged, and, so far as has been ascertained, the nature of it is acid in all insects; a fact to be kept in mind in seeking an antidote. The mosquito and some others implant their venom without at the time attracting our attention, and we have to treat the effects, unless indeed we can use preventives. In the case of bees, the sting serves but once, and is commonly left in the wound inflicted by it. So long as it remains, it appears to give out fresh quantities of poison, or the sufferer spreads it by rubbing in his vain efforts to relieve itching.

Besides the bites of insects and reptiles, there are bites inflicted by animals upon others, dog and cat bites, and very serious wounds by stallions upon one another. For the treatment of the latter class the reader is referred to the chapter on Wounds, but those caused by dogs and cats, not requiring surgical measures, may be considered with stings and bites of insects as needing some minor attention.

Treatment.—Remove stings with forceps or tweezers, or lift out with a darning needle. Bathe the parts with an alkaline solution, as common soda dissolved in water, or touch the spot with a crystal of soda, or with the blue bag. Liquid ammonia is one of the best alkaline agents, as it is penetrating and likely to find the point of puncture in a hairy animal; it neutralises formic acid (which is the principle of insect poisons) more quickly than anything else. When an animal is stung upon the eyelid or other sensitive part this recommendation of ammonia does not apply, as more damage may be done by the remedy than the sting, and we may here advise cocaine, to allay the pain and prevent the patient doing himself damage. A convenient lotion will be found in the following:—

Cocaine	20 grains
Brandy	40 drops
Glycerine	40 ,,
Water	4 ounces

Dissolve the cocaine in the brandy and water, and add the glycerine. Paint the painful part every quarter of an hour until the symptoms subside.

Menthol, as sold for neuralgia in chemists' shops, is a useful application for stings about the nude parts, but not around the eyes. Five per cent. carbolic acid lotion allays pain, or carbolic oil may be used. The latter, or camphorated oil, answers well for cows whose udders have been stung by wasps when inadvertently lying down upon them (the usual way of incurring this trouble). Dog and cat bites which are merely punctures and not torn or lacerated wounds give rise to anxiety. They should be fomented with an antiseptic as soon as possible, and wrapped in carbolised oil, when they rarely cause further trouble.

Preventive applications.—These are generally sought in vain, and the man who discovers a real preventive will confer a lasting boon on his fellows, and a fortune on himself without much trouble. That a decoction of walnut leaves is distasteful to horse flies is true, but its virtues are so soon spent as to be of very little use, and the chief preventives are costly, because they are essential oils.

Water that has been agitated with paraffin is a deterrent to most insects, and camphorated water repels them. Oil of pennyroyal and of eucalyptus diluted with some thin cheap seed oil is not too expensive for limited application. An infusion of quassia chips made by digesting a quarter of pound in a gallon of water with a tablespoonful of paraffin is about the cheapest and most lasting, where a large surface has to be protected.

WARTS AND EXCRESCENCES, WENS, ANGLE-BERRIES : VERUCCÆ.

None of the domesticated animals are exempt from warts, and horned stock in the field are just as liable as dogs and cats habitually housed.

Warts are composed of piles of the scales of the outer skin, as a rule, but there are encysted warts, so called, which should be classed with tumours of other kinds. For our present purpose we have only to classify them in order to decide which of several methods of treatment is most applicable.

As to their cause, we know about as much as the ancients, who attributed them to malign spirits, and their cure to enchantments or incantations. That they come and go without any apparent reason is known to most people, and that their disappearance from the hands of fair maidens, after certain midnight invocations or the chanting of verses of doggerel and throwing of salt over black cats, is undeniable, but the writer is not prepared to give so much credit to these methods as to the less romantic suggestions which follow. Perhaps charms do not " work " on animals, because they are lacking in imagination ; perhaps, on the other hand, animals *see* what we only imagine, and most dispute, and, were not speech denied them, might give us lights on theology.

We may roughly divide warts into pedunculated or narrow-necked, broad-based or spreading, and encysted. There are, besides, troublesome warts which belong to none of these : as, for example, the hundreds which will suddenly appear inside dogs' mouths, and having a base about equal to their altitude.

Treatment.—For the pedunculated, or any having necks capable of constriction, the ligature with or without a caustic agent. For the broad-based, various applications of a caustic nature. For the encysted, a bold stroke of the knife which will lay open the cyst and permit the escape of the hard body with perhaps a little assistance from the finger and thumb of the operator. Ligatures will be chosen with some regard to the size of the wart, and should be tied with what is known as a doctor's knot, or one of a kind that will not relax. If previously well dressed with a paste of corrosive sublimate, or arsenic, or chloride of zinc, the action will be hastened, but the mere fact of strangulation will cause the death of a wart, since these abnormal growths, like every other living tissue, depend for their maintenance on the blood

circulation within. These should give the amateur very little trouble, unless their situation renders our advice impracticable. Mares with warts between the thighs, horses with the penis involved, and so on, present difficulties which must be overcome by securing the animal against injury to himself or attendants (*see* Methods of Control).

Preparation of the broad-based or irregular warts by saturation with an alkali, as washing soda or soap powder, will enable the operator to get rid of warts in half the time usually occupied. The dry hard surface causes any aqueous preparation to fall off, with very little damage to the wart, but the nature of these (*see* introductory paragraph) is such that alkalies open up the leaves of which they are composed, and the caustic agent then applied goes right into the substance of the growth.

The most efficient but not most safe application is one composed of arsenic and soft soap, using as much of the former as the latter will absorb to form a paste. The surrounding sound skin needs to be avoided, or serious sores may be induced. This substance is particularly useful for spreading or confluent warts. Such as are situated upon the eyelids, about the muzzle, on the teats, and in other dangerous situations should be treated with a solution of salicylic acid one part to collodion seven parts. The mineral and other acids are also used to destroy warts.

Those within the mouth, or on mucous membranes elsewhere, may not be treated safely with any of these things. The writer has been assured, on good authority, that fresh blood, warm from the slaughter-house, will remove warts from the mouth after a few applications. He has not, however, seen such cures, and refers the reader to previous remarks on charms and incantations. Black treacle is sworn by as a cure for warts, but I have not seen it used.

HORN IRREGULARITIES.

Skin, nail, hoof, and horn are very similar in composition, as anyone may demonstrate to his own satisfaction by a scraping of either, soaking it in a little liquid potash, and mounting on a microscope slide for observation under a moderate power. The difference is in the arrangement of the layers; as in the laying of a brick pavement, or building a house. Horns which turn in may grow in such a manner as to pierce the animal's own skin, and even penetrate the skull. They should be sawn off or reduced to safe

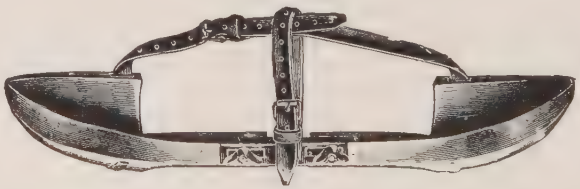


FIG. 46. HORN-TRAINING DEVICE (*Huish*).

proportions and guarded by a metal knob or ball. The appearance of a beast is often quite spoilt by the irregular growth of one horn, and appliances are now sold for training them. The horn is, of course, without sensation. The core is not particularly sensitive, but there is no doubt some pain caused when the latter is cut. Necessity only justifies dishorning, but the question as to the existence of sufficient justification for dishorning cattle with no deformity, in order that they may feed peaceably and suffer no tyranny from a "master" bullock, must be decided by each man's conscience, if he dwell north of the Tweed; but in England the Courts have decided that it is an

act of cruelty, punishable by fine or imprisonment. It is easy enough to prevent calves from growing horns, if the buds are rubbed two or three times with a caustic alkali. With considerable experience of the transportation of American cattle to these shores, we must say that we have seen more broken ribs and serious injuries among polled cattle than among those having horns. There is a very thick skull in the hornless breeds, and a great

FIG. 47. HORN-TRAINING DEVICE (*Huish*).

liking for "ramming" with it. We attribute the fewer injuries among horned cattle to the same cause as the better manners among gentlemen of the eighteenth century (as compared with the twentieth), when everyone wore a sword, and on the slightest provocation was ready to whip it out, while hissing through his teeth "'S death!" or "'S blood!"

Broken Horns.—Cattle break their own horns in various ways, and the bleeding is often very profuse. It is not much use sticking them on again, the separation is too complete for reunion save in very rare instances, and our object should be to save pain, prevent hæmorrhage, and keep out septic germs. All this can be accomplished by binding on a pad of tow or cotton wool, soaked in carbolic oil, and over this a layer of tar, and another of tow or any bandaging material which can be retained in place by attachment to the other horn. Underneath these the reparative process goes on, and an inferior, abortive-looking horn may take the place of the original in course of time; more often a stump or irregular shape is left. It is important in fly countries to cover the original parts with plenty of tar, or maggots are soon found in the sinuses of the head, and death is too often the result. Excessive hæmorrhage may be stopped by the hot iron, or tincture of iron (*see* Hæmorrhage).

MANGE OR SCAB.

All the domesticated animals are liable to mange, and most probably all wild fur-bearing animals.

Three family groups are recognised: the symbiotes, whose habit is to wander upon the surface of the skin; the dermatodectes, which bore through the skin; the sarcoptes, which both bore and make galleries or runs under the surface of the skin.

Each species of animal has its own mange mites. The sarcopt or symbiote of the horse is not the same as that causing scab in sheep, or mange upon a bullock, a dog, or a cat; but transference of infection from horse to horse, bullock to bullock, sheep to sheep, dog to dog, is all too easy.

Symptoms.—The first symptoms of mange are those of itching, rubbing, scratching, and uneasiness, followed by falling out of the hairs, sore places, and discharges, according to the species of mange, the virulence, duration, and time of year.

Some years specially favour the development of mange mites, and herds of wild ponies have been decimated from time to time. The head and neck, mane and tail, are favourite seats of mange, but it may affect any part, and eventually cover the wretched object of attack.

Treatment.—Having regard to the different habits of the various families of mange mites, the importance of identification will be seen, for it will be easy to dispose of the symbiotes on the surface, less easy to ensure the destruction of the dermatodectes which bore, and difficult to destroy pregnant females or the deposited eggs in the long galleries formed by the sarcoptes.

The microscope will settle the question which parasite has to be dealt with, but it will be wise at once to isolate any animal which shows symptoms

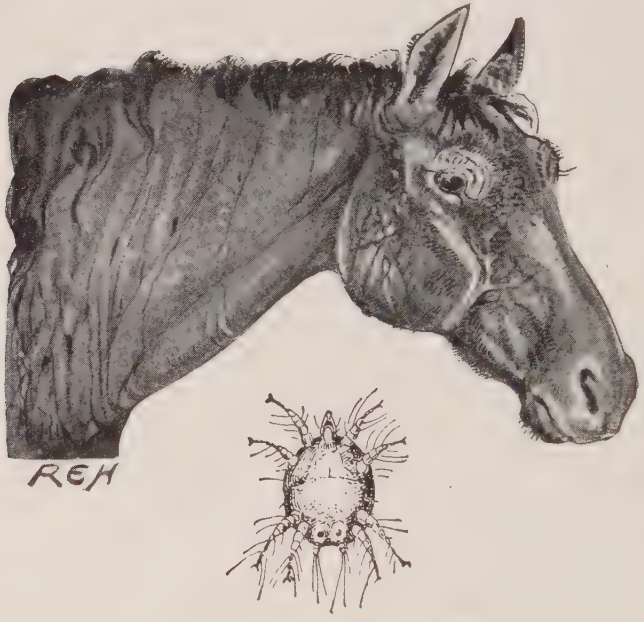


FIG. 48. SARCOPTIC MANGE.

of mange, and any brushes, stable tools, clothing, or other things used in connection with the affected one. To whatever family the mange mite belongs, sulphur is the most effectual destroyer. The difficulty is to get it into contact with him. A simple ointment composed of one part of sulphur to six of lard will be sufficient to destroy patches of the symbiotes; but something more penetrating must be used for the burrowers, such as a 4 per cent. lotion of carbolic acid, or stavesacre ointment in the proportion of one to seven of the powder in lard. These may be applied daily, taking care to go a little beyond the apparently affected parts. Where the disease has been in existence some time, and crusts or scabs have formed, or corrugations in the skin (*see* Fig. 48), with an ichorous discharge from the cracks between, it will be advisable to thoroughly wash with warm water and plenty of soft soap, as this will remove much débris and permit the approved dressing to penetrate. A soft brush may be used to ensure the lotion getting under the folds of tumefied skin.

The danger of absorption of such agents as carbolic acid is not so great in scalded skins as in sound ones, although the contrary might be supposed. An effectual and (in my hands) safe application is made by infusing two ounces of shag tobacco in a gallon of boiling water, dissolving a drachm of corrosive sublimate in it and adding a wineglass of paraffin, shaking well, and applying with a brush. Whatever is used needs to be repeated every five days, for at least three times, as there will be immature parasites or eggs too deeply buried to be destroyed by the first application, and the repetition of the dressing ensures the death of all newly hatched mites before they have time to reproduce. It often happens that the cure is almost complete but here and there a spot erupts afresh. Such limited areas may be effectually treated with mercurial ointment or a 2 per cent. solution of corrosive sublimate and table salt. Cattle bear a dressing of oil of tar one part, sulphur two parts, train oil five parts, without too much irritation of the skin, but horses are rather apt to blister. The same applies to a simple and often effectual dressing of one part of paraffin to three, four, or more parts of linseed, or any cheap fixed oil.

Sarcoptic mange is effectually treated by baths of arsenite of soda, as it is found that the skin absorbs and deposits the drug in the deeper layers of the skin, thus reaching the ova in the galleries formed by pregnant females. (*See* Red Water.)

Horses often respond to the titillation test, or rubbing with a coin or stick about the region of the neck and croup, because infested with forage acari, and are not the subjects of mange. The response is in the form of twiddling of the lips and bending of the neck, which is a method expressing gratification. In really bad cases the animal will almost "fall upon" the person thus rubbing him, but it is only a rough test at the best.

One of the many forage acari is armed with claws like a lobster and has been seen under the microscope with forage mites of other kinds, one in each claw, about to be devoured.

Students wishing to pursue the subject with a moderate power "mike," will find the description following of some assistance.

Sarcoptes.—Short rostrum, round body, short thick legs hidden under body, suckers on single long pedicle, burrowers. Smaller than Sarcopts.

Psoroptes, or Dermatodectes.—Elongated rostrum, oval body, suckers at end of legs on three-jointed pedicle. Live on surface or under crusts. Don't burrow.

Symbiotes or Chorpptic.—Broad rostrum, oval body, leg suckers on wide short pedicle. Live on surface like Psorpptes.

LEG MANGE.

There is an itching of the legs by which the feather of many Shire horses is spoiled, and sores and blemishes caused on others, due to a parasite, the symbiote : one of the mange class. It is nearly always mistaken for incipient grease. It begins about the heels and pasterns, most often of the hind legs, and at first excites a mild irritation at night when the parasites are actively moving about on the skin to obtain their food. The horse rubs his foot against the opposite leg, and sometimes wounds the coronet or prominent part of the fetlock by means of the shoe, and the exuded serum constitutes the food of the mites. The parasites seldom go higher up the leg than the hock, and are often content to remain below it. Unless there is the smell of grease on the finger when the leg is rubbed, one may suspect these symbiotes and soon put an end to them : to the very great advantage of their host, who is robbed of his sleep and blemished by his futile efforts to dislodge the enemy Clipping the limb will facilitate the treatment.

All the parts involved and a little beyond should be smeared half an inch thick with soft soap, which may be allowed to remain on for a night, then washed off with plenty of warm water, and sponged nearly dry before again soaking, this time with a strong decoction of tobacco—four ounces of shag in a gallon of water boiled for half an hour, or a 5 per cent. solution of chloride of zinc. The latter is a little disposed to scald thin skins, and the former will answer well if the "ground" has been well prepared by the soft soap which lifts the cuticle under which the symbiotes hide. The ordinary coal tar preparations in common use as disinfectants will destroy the parasites if used at about 5 per cent. strength. One application is often enough, but it is well to repeat it in four or five days, as a few may have escaped and these will quickly breed again. We have seen many horses restored after suffering from itchy legs for years and being dosed with diuretics and treated for incipient grease, whereas the above simple remedies would have sufficed.

Mange must be declared.

SHEEP SCAB. THE SCAB OR SHAB.

The most important thing to know about this disease is that your sheep have not got it, and if they have, the next is your duty to give notice to the police, and obey the instructions issued by their authority, after the veterinary inspector has pronounced.

There are probably few people who do not know that scab in sheep is similar to mange in other animals and caused by an acarus.

FIG. 49. THE SCAB PARASITE.

Sheep affected with scab are seen to rub, or the first symptom observed will be broken fleece, small portions coming out, as if caught in thorn bushes. On the least suspicion the animal should be examined. It will generally lean to a stick if pressed against a suspicious part, as a grateful sensation is imparted by so doing. Suspects should be separated at once, as no harm will be done if it turns out to be some other disorder, and infection of th flock may be stayed.

If a specimen is to be examined with a microscope or fairly good magnifier, it should not be taken from the most broken and oldest sore place, but some

wool should be pulled out where the most recent break in the fleece appears, and here close to the skin will be found whole acari, or at least crumpled bodies sufficient to identify the disease.

Treatment.—Every flock-master is familiar with the practice of dipping, and there are many trustworthy dips before the public. Accidents arise from using arsenical dips, it is true, but in the writer's experience they are always due to carelessness and the non-observance of the instructions issued with the goods sold by reliable firms. All the derivatives of coal-tar have been used in some form or another, and for a time carbolic acid had a vogue. The objection to it was the necessity of using some proportion of glycerine as a solvent, and this after a while offered a sweet attractive matter to the fly. The old dips which were composed of soft soap and arsenic, brown umber and sulphur, were good enough for those who took the trouble to mix them in right proportion, but did not so completely dissolve the arsenic, as is the case with the packeted preparations already mixed with caustic alkalies, and in such convenient form as to have practically displaced all others.

DOGS AND CATS.

Dogs are effectually cured by a mixture of one-third each common oil of tar, turpentine, and olive oil, but the whole body should not be covered at one dressing. *This lotion must on no account be used for cats:* it would be certain death. Cats are peculiarly susceptible to the coal tar products, and should not be washed or dipped in any of the creosote emulsions which are sold under so many names, but are all recognisable by their smell and behaviour when mixed with water. For delicate dogs and for cats we may find an effectual remedy by boiling together four ounces of sulphur and one ounce of slaked lime for half an hour in a gallon of water. To the strained product should be added four ounces of glycerine, and the animals may then be saturated with the lotion without risk; indeed, the trouble is to get them really saturated, when they have long hair and much woolly under-coat.

CANKER OF THE EARS.

The origin of many cases of so-called canker in the ears of both dogs and fashionable cats (the common or garden tabby was never much subject to it) is the presence of a symbiote (*Symbiotes auris*) in the meatus, or ear passage. They can be seen sometimes as tiny white or greyish specks. The irritation caused by them induces the unfortunate host to shake his head and strike the base of the ear with the hind foot. This action on the part of the dog or cat sets up inflammation of the lining membrane, and the wax and sebaceous glands are involved, pouring out an irritating substance which still further damages the delicate lining of the ear, until ulcers and cracks are established, and a very obnoxious smell issues from the parts and is known as the most pronounced symptom of canker.

Treatment.—Early recognition of the cause makes the treatment easy and successful. An oily lotion composed of one part of nitrate of mercury ointment and twenty parts of olive oil is poured into the ear, and the base manipulated to ensure its diffusion throughout the cavity. Two or three dressings will destroy the parasites, after which the ear should be carefully cleaned with cotton wool on the end of a smooth bone penholder, and for a few nights a lotion poured in, consisting of equal parts of liquor plumbi (the strong solution of diacetate of lead of the British Pharmacopœia) and distilled or rain water. Ears which have had canker and remain dry and harsh (through loss of secreting power on the part of the sebaceous glands) may have an occasional dressing of lanoline ointment or cold cream.

An excellent lotion for this trouble in the ears of dogs and cats is made as follows :—

Oxide of zinc	1 dram
Sulphate of zinc	10 grains
Boracic acid	40 grains
Glycerine	4 drachms
Water to	4 ounces—mix.

Shake well each time of using. Fill the ear night and morning and press lightly outside with finger and thumb and prevent the animal from shaking his head.

Canker of the Outer Ear.—Several diseased conditions are confused under this name. One of them, which is not canker at all, may have its origin in the symbiote. It is a fluid abscess between the skin on the inside of the ear and the cartilage which gives its substance. Both dogs and cats get these serous cysts very suddenly. They should be boldly laid open and the fluid evacuated, or it will become by degrees solidified, and by its pressure cause wasting of the lobe of the ear ; a frequent disfigurement often to be seen in both dogs and cats.

The only difficulty consists in preventing the reunion and refilling of the cyst. This may be effected by stitching down the sides, or plugging the space between the skin and cartilage, until the original secreting membrane is destroyed ; then a perfect cure results, but a scar remains.

It is often necessary to syringe tincture of iodine daily into the opening made by the lancet to prevent re-formation of the fluid from the membrane, which should be carefully lifted out with forceps or the tweezers of a pocket knife.

Another malady known under the name of external canker is that in which an injury has been done to the flap of the ear, the tip, or some portion of the margin, and almost always in long and drop-eared dogs. Some portion of skin is lost, and the cartilage is ragged and indisposed to heal. The animal constantly shakes his head, and destroys any attempt at repair on the part of nature.

Treatment consists in restraining the dog while encouraging granulation, but it will in many cases be necessary to remove with knife or scissors some dying portion in order to get healthy reparative action. This done, the wound may be painted with collodion, or a mixture of equal parts of friar's balsam and glycerine daily. The dog's head should be covered with a canker cap ; a contrivance which prevents shaking and fresh injury, but retains evil-smelling discharges, unless made of special material permitting of evaporation. Such caps are now sold.

RINGWORM, WHITE FLAW, THE FLAW, ETC.

Ringworm is caused by a vegetable parasite known as the *Tinea tonsurans* (genus Tricophyton), and affects man, horse, ox, sheep, goat, pig, and cat. It may be transferred from any one species to another. The writer had an assistant who nearly lost his life from this cause, being infected by calves, through his zeal in first scraping the white patches with a nutmeg-grater and then treating them in a manner which led to blood poisoning. The fact is mentioned here, because veterinary books published since this happened speak of the communicability from animals to man, and *vice versa*, as "said to be," and it is important that men engaged about stock should know that they or their children may be infected, unless precaution is taken.

Symptoms.—It is hardly necessary to describe the white rings or patches which form upon young stock in the spring months, especially those in courts or yards, where it may be assumed the spores are always present to a greater

or less extent (upon the woodwork, in the author's opinion), and annually recurring where the boundaries are made of timber. The head and neck are favourite situations, probably because most easily infected by rubbing. Poor animals of every age are more disposed to contract ringworm than those under whose skin reposes a nice layer of fat.

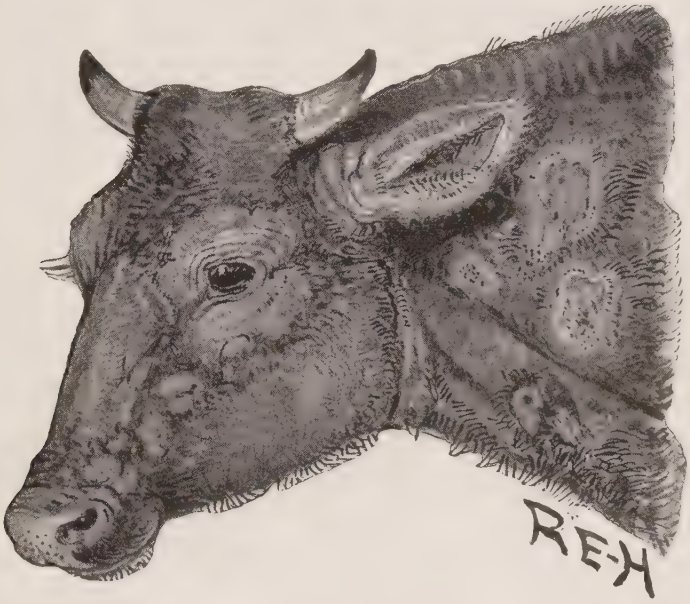


FIG. 50. RINGWORM.

Treatment.—Beware of the sample given above, and do not try a short cut. There is really little difficulty about it, if the trouble is taken to give two or three dressings at intervals of a week, of one part of creosote and eight of olive oil, or equal parts of common oil of tar, sulphur, and train oil. Sulphur ointment alone will usually effect a cure, but in a few cases of long standing, where a great accumulation of white débris covers up deep-seated growths of the fungus, it may be advisable to use some very penetrating substance, as tincture of iodine, or a 5 per cent. solution of perchloride of mercury (corrosive sublimate). The question of cost is a consideration where a lot of stock are concerned, and the tar preparation above advised will be found comparatively inexpensive, while effectual in almost every instance.

HONEYCOMB RINGWORM, FAVUS.

Ringworm of another kind, and known as favus, is not common in this country, but it is of a more serious nature than the *Tinea tonsurans* described in the previous paragraphs. It forms as a waxy-looking depression in the skin, and is most difficult to eradicate unless roughly cut out and afterwards treated as a common wound. Its importance consists in its communicability to children, who cuddle the cat, that has caught the ringworm of the mouse or rat when she seized it in her mouth, and so become affected about the lips.

Treatment.—Nitrate of mercury ointment or other mercurials may be used for animals over small surfaces without much fear of salivation. Painting the cups with a tincture of iodine or with a solution of sulphate of iron or sulphate of copper, if prepared by soaking in warm water.

FLY MAGGOTS, SHEEP FLY, STRUCK WITH THE FLY, ETC.

On the hills and away from trees, sheep are not much troubled by the flies which strike them elsewhere and produce a crop of maggots in a very short time. Soiled parts offer special invitation to the fly, which will strike those that have suffered from scour, or have been held by milky hands during lambing time. In muggy weather under trees or high fences much damage is often done, and it behoves shepherds to keep a sharp look out and turn the first sheep they see shaking his tail or rubbing. Old-fashioned shepherds in fly districts carry a bit of so-called "fly-stone," which is a convenient lump of corrosive sublimate (elsewhere called perchloride of mercury), and with this rub the spot writhing with maggots. It is instant death to them, and has no greater objection than the destruction of the wool roots in that portion of the skin. A mixture of one part of turpentine and three of olive oil answers the purpose quite as well, and the most popular of fly oils is composed of carbolic acid one part, rose-coloured oil ten parts. This both kills the maggots, protects the spot, and assists it to heal up.

Prevention is preferable, and may be attempted by applying creosote emulsion, such as phenyl one part in sixty to eighty of water, or sprinkling, from a fine rose and water can, some spirit of tar. The most lasting fly preventers are those compound powders in which spirit of tar is incorporated and sprinkled over the fleece after a dewy night or with the help of the water can. The following is a well-tried one and can be recommended :—

White lead	2 lbs.
Red lead	1 lb.
Sulphur	1½ lbs.
Spirit of tar	4 ounces

Rub the spirit of tar in a mortar with the leads, add the sulphur gradually, spread on paper for six hours, and keep in covered tin. A flour dredger is a suitable vehicle for distributing it over the fleece. Two dressings usually suffice for one fly season.

FLEAS, TICKS, LICE.

Many domesticated animals are troubled with fleas. The flea of the dog or cat may wander on to the person of the owner, and cause the fair mistress some annoyance, but she need not be believed when she attributes all the fleas in the blankets to dogs and cats; it is an unjust accusation. This is not the place to tell her how to get rid of them, but in the case of dogs we may confer the order of the bath, and make it of one part of phenyl or Jeyes' fluid to eighty parts of water—about a wineglass to two quarts of warm water. No flea can withstand this, but it must reach him to have its effect, and here is where so many persons fail. They begin by standing the dog in a bath and wetting his back, thereby giving the parasites warning to flee from the wrath to come, and seek refuge about the ears and eyes, where perchance a few, possibly pregnant females, escape the general deluge and subsequently play the part of the Noah family.

Some of the red or white-skinned lap dogs of the Maltese class are too susceptible to coal tar derivatives to bear even so mild a bath as that above advised, and these should have a strong infusion of quassia chips, four ounces to the gallon of boiling water infused for an hour. Daily combing and brushing of pets leaves but little chance of serious infestation with fleas.

Cats must on no account be bathed in carbolic or creosote preparations, as they readily absorb such poisons. They are not agreeable subjects to wash at any time, and in their case it is wiser to depend on powders rubbed into the coat against the lay of it—from the tail backwards—and then to

combing and brushing. The ground flowerets of pyrethrum or Persian powder in the fresh state is effectual, but is more troublesome than the bath for dogs.

Lice are liable to give trouble to all animals under man's subjection. The same substances which destroy fleas are equally destructive to lice. We cannot, however, bath the horse, or put a number of bullocks through the same process in the east winds of spring, when the first bright hours of sunshine demonstrate their presence. In such circumstances we take advantage of the insect's peculiar system of breathing through pores in the sides, and effectually smother them by dressing the hosts with oil; any oil will do, but a convenient and penetrating mixture is one of paraffin to seven or eight of linseed, cotton seed, or other cheap fixed oil. The phenyl emulsions do well enough if the horse or bullock is thoroughly soaked with it, but this seldom happens, and if we succeed in wetting large animals all over in cold weather, we must take considerable risk of chills. On a bright day one may wash with soft soap and dress either with the above or with a decoction of stavesacre four ounces to the gallon, boiled for an hour; but the subject should be exercised until thoroughly dry after it.

Pig lice are large and tenacious of life, and the hosts are more sensitive to drugs than most species of domesticated animals. A 4 per cent. solution of creolin will kill the lice, but pigs often show some funny antics while under the influence of it, and my own preference is for smearing limited areas with mercurial ointment or common train oil. The lice generally congregate around the ears and neck, and two or three dressings will dispose of them. There can be no doubt that they annoy pigs and hinder their progress.

LUMPS AND BUMPS, BOILS, ABSCESSES, ETC.

In the veterinary columns of agricultural papers, queries are frequently put respecting animals with lumps, bumps, and enlargements. The information is very often meagre, and the expert on the staff of the paper is not always able to advise. In some cases one can make pretty certain of a correct diagnosis, in others a probable one, and there remain such as one may make guesses at after a long experience of weighing probabilities and eliminating the least likely. Some correspondents give a description of a "lump" in few but concise terms, stating where the enlargement is situated, how it feels to the touch, whether it is of recent origin or of long duration, hard or soft, painful or cold, or yielding to pressure with a dimple, or rapidly refilling as if full of fluid. A person of trained observation will make these distinctions.

The situation of a swelling is of first importance—whether upon a joint or a fleshy part will make all the difference.

We know a West-country district where farmers are in favour of "hitting a knife into it" whenever they see a swelling on a horse or beast, and if it happens to be a ripe abscess in the fleshy parts of the brute, the matter spurts out and a cure follows, but these bold surgeons (?) (like bad carvers) sometimes forget where the joints are situated, and let out something that should be carefully kept in, namely, joint oil. This we have known to happen several times, and have come to the conclusion that the timorous man with a fear of blood is less likely to get himself into trouble, than he who with the boldness of ignorance, is ever ready to "knife" his own and his neighbour's cattle.

ABSCESSES OR BOILS.

Blows or other forms of external violence account for most abscesses. The swelling is from the first tender, and increasingly so as pus forms. No time can be assigned for the formation and discharge of an abscess, as it

depends upon the depth at which the matter is forming, and the nature of the tissue through which it has to penetrate before reaching the surface. A blow from the drover over the rump or loin of a beast may result in an abscess in a "joint" sold by the butcher next week, while a blow on the poll, or pressure from a saddle on a horse, may result in an abscess in weeks or months to come. In muscle the formation is rapid; under dense fibrous tissues it is very slow.

Treatment.— Whatever the cause and wherever situated, the treatment should be aimed at early evacuation. Poultices and fomentations have the effect of promoting nature's plan of making the abscess "point." By pointing is meant a thin place in the skin which bulges, or shows a little eminence above the surrounding skin. It feels softest at this point; indeed, anyone endowed with feeling can discern the matter fluctuating under his finger. This is the time for opening it. Not by feebly pricking at it and thereby causing much pain, but by a bold slit with a lancet or sharp knife. Don't "hit a knife into it," but take hold of the blade between finger and thumb, allowing only half an inch or so, according to the situation of the boil, and make a wound in the shape of a crescent. It may be enlarged after you have proved the safety of such a proceeding, if found necessary. Syringe out with an antiseptic, and introduce a pledget of tow dressed with carbolic lotion, or any other germ destroyer you may fancy. My own preference is for one part of turpentine and two of linseed or other fixed oil. In a beast that is to be turned loose again in summer time, a smear over all, of tar, will be advisable to keep flies off. Although not consistent with surgical rules, experience shows that covering up an opened abscess is not good treatment. Dogs do their own dressing, and are apt to overdo it a little, but they make excellent recoveries as a rule. In the majority of cases the treatment above advised is applicable, but there are deep-seated abscesses in situations which cannot be got at by these remedies, such for instance as occur upon the shoulder point of harness horses, and take months to "point." These may be hurried up by liquid blisters, not too strong or at intervals too long apart; the liquid fly blisters, or turpentine and oil, are suitable (*see* Blisters).

Correspondents often describe a lump on the jaw or under the tongue, below the ear or in the throat, and these are frequently glandular swellings. The submaxillary, sublingual, parotid, thyroid, and other glands are subject to inflammation from colds and other causes, but especially in those specific diseases known as actinomycosis or wooden tongue, tuberculosis, &c., having a special character of their own. If they impart only a feeling of hardness to the finger, they may very likely be dispersed by warm fomentations, or yield to an iodine liniment (*see* Liniments), or if they feel like forming matter and pointing (*see* Abscess) they may be encouraged to do so, and be lanced, and the pus allowed to escape. If in doubt as to their exact cause, the farmer will be pretty safe in syringing into them a mixture of equal parts of spirit of turpentine and tincture of iodine. This fluid may be used for such lumps as remain indolent and neither disperse by our efforts nor come to a head. If tuberculous, the specific bacilli will be killed by this preparation, and if caused by the ray fungus (*see* Actinomycosis) the organism will fail to sporulate. Some other of the lumps and bumps described prove to be encysted warts, or little hard fibro-fatty tumours contained in a thin skin under the common integument (*see* Warts). They should be cut open and squeezed or pulled out. Some of these lumps about the faces of horses are caused by the bridle, and contain cheesy matter. Evacuation and painting inside with the iodine and turpentine mixture is suitable treatment. Old dogs, and especially those with blue in their coats, are predisposed to little lumps com-

posed in parts of this cheesy matter and of pigment which has left the hairs and agglommerated as a tumour. The same measures are suited to their obliteration, or they may be lifted and strangled in the manner recommended for pedunculated warts, which *see*.

Blows upon the lower parts of the limbs, kicks often enough, produce abscesses in position where the use of the lancet would spell death to the patient in any but the hands of an anatomist, and the home treatment should not go beyond poulticing and fomentations, to which fortunately the parts lend themselves readily. More often kicks and blows upon the lower parts of the limbs result in bone bruising and the formation of lumps and bumps of the character of splints (*see* Splints). The treatment of inflamed periosteum advised in connection with splints is applicable to enlargements of this kind.

Some of the lumps for which one is asked to prescribe at a distance turn out to be bog spavins and thoropins, and will be found described elsewhere.

SEROUS ABSCESS.

Another kind of abscess, invariably superficial and therefore amenable to treatment, is the so-called serous one, because its contents are chiefly serum or the colourless part of the blood. The nature of the fluid soon changes, and varies from straw colour to brick red, but has no resemblance to the pus abscess or boil referred to in the previous pages.

They do not point as a rule, but slowly harden by the increasing density of the contents.

Treatment.—A very bold opening should be made and the fluid squeezed out; after which the finger or an instrument should be introduced to break down adhesions. There is a disposition to form a lining membrane or cyst from which new matter is constantly reproduced, and the wound rapidly seals up, only to make matters worse than before lancing the abscess. If any doubt exists it is well to put a seton through at first, bringing the needle out at the lowest point and dressing it with turpentine or some other irritant daily, and moving the tape to and fro (*see* Setons). If the membrane is not destroyed, the serous abscess will keep on filling as often as it is evacuated

SADDLE AND HARNESS GALLS.

It is annoying to have a horse thrown out of work, and at a busy time, by a gall no bigger than a sixpence; yet many horses are incapacitated, and many men have been fined for working them, with no more serious malady.

Galls are generally caused by ill-fitting harness or gear, but some skins are specially susceptible, and it is almost impossible to keep them whole.

Harness and saddlery should be more often looked over by the master, and defects of stuffing, &c., made good in the slack time of year. Dried sweat and grease mixed with grit cause a good many galls, and some horses keep right until a wet day, when rain gets under the collar.

Treatment.—Removal of the cause should be the first consideration, as then we may be able to work the horse while the sore place is mending. Cutting out the stuffing, or introducing pads under the collar or harness saddle, or a numnah under the riding saddle, may relieve the injured spot, and to avoid rubbing, some precaution may have to be taken in the way of shortening the harness crupper, or putting a martingale on the riding saddle. By whatever means we can contrive to keep the gall absolutely clear of the rub, we gain the services of the animal. Sometimes a leather bootlace attached to the hames will be just enough to prevent a heavy collar

jogging forward and galling the withers. As a lotion for application to a recent gall, there is nothing better perhaps than a drachm of burnt alum dissolved in a pint of water with a drachm of dilute sulphuric acid added. It should be applied two or three times a day, and if the horse is working

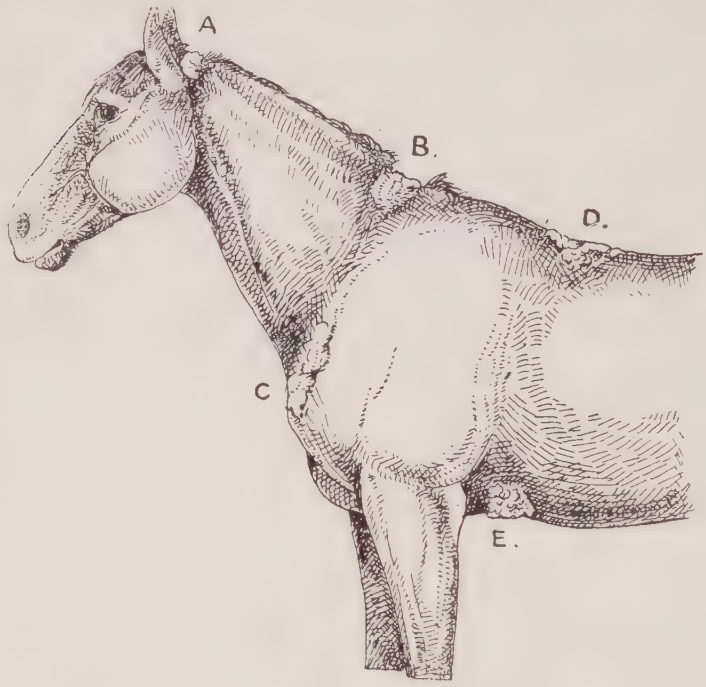


FIG. 51. LOCATION OF GALLS.

it will be well to do it while his skin is wet with perspiration, letting it dry on in any case. If no deep mischief has been done, the above application will restore the parts in a few days.

SITFAST.

This is an injury to the skin amounting to more than a gall, but not immediately killing the portion concerned. It is known by the edges of a more or less circular patch of skin beginning to curl up; the centre meantime appearing normal or nearly so. The name represents the disposition of a piece of skin so injured, for it *sits fast* a tedious while, if we are content to wait and watch nature's slow but effectual process of casting a slough.

All the time this is going on, the horse is useless for work, and most of us will be disposed to cut it clean out and make a surgical wound. In my own neighbourhood lived a "specialist" whose one speciality was to take hold of sitfasts with his teeth and pull them out; for which he received a well-earned shilling. Pulling is really better than cutting, for one may leave behind some portion that will subsequently die when employing a very sharp instrument and performing the work rapidly.

Another plan of treatment is to foment and poultice, and by softening, detach a little more each day. Others insert a caustic point under the curling skin, or a paste of arsenic, which does the work more quickly. The cutting or tearing out is really so much quicker that it is the more merciful in the long run, and if we would minimise the pain we may first soften with

warm water and then dress liberally with a 10 per cent. solution of cocaine, and the animal will scarcely feel the operation at all. Any simple disinfectant may afterwards be employed while the cicatrix is forming.

FISTULOUS WITHERS.

Bruises from the saddle or harness pad which have included the dense structures covering the spinous processes of the dorsal vertebræ, which are here longest (highest), may cause no great pain or flinching at the time, but presently swell and slowly form an abscess which, if left alone, will eventually break, or if poulticed come to a head and discharge sooner—the more so if lanced when ripe; but it does not heal up as expected, and a little hole remains, from whence comes a variable discharge. This is a fistula (*see* Poll Evil and Quittor).

As in poll evil and quittor, the dead tissues acting as foreign bodies necessitate a drain. As with those diseases, an inadequate one is formed, and we have to adopt the plan of destroying a lot more tissue, getting a large slough, and subsequently healing up by granulation (*see* Wounds).

The fistula must be probed to the bottom and laid open, then dressed with some escharotic, as arsenic paste on a tape, passed through with a seton needle, from the highest to the lowest point. A ten or fifteen per cent.

FIG. 52. FISTULOUS WITHERS.

solution of chloride of zinc is a good dressing, but should be used no longer than to assure the attendant that the pipe is destroyed, for granulation is apt to be very slow after zinc chloride; the still more destructive corrosive sublimate is not so lasting, yet is effectual.

After the seton is removed the parts heal up, and if the sinus is destroyed the healing is complete; if not, there will remain a little red spot with a mere bubble in it, which later proves to be a fresh fistula, and the work must be done over again, and the sooner the better. A famous American specialist fills the hole with red blister (*see* Blisters).

Our Army in France had the best results with the injection into the fistulous opening of one part, by weight, of crystals of carbolic acid, mixed with

three parts of glycerine. The principle of osmosis or the passing of the rarer into the denser medium was here obtained, and the powerful acid came in contact with the infective material.

Many veterinary surgeons, after ascertaining with a probe the depth and direction of the sinus, cut open the flesh and get right down to the seat of the trouble, which often enough is a pocket of pus with some dead tissue in it. Complete evacuation is thus obtained and the wound heals in a short time.

Many horses passing through my hands at the Swaythling Remount Depot had been thus boldly operated upon for fistulous withers, poll evil, and quittor in the foot. No amateur should attempt such radical operations if professional aid is procurable; better trust to the slower methods already mentioned.

ACNE. GERMAN MEASLES.

Besides the usual pimples and eruptions which come under ha ness and saddles, there is a troublesome form of small indolent boils or pustules called acne or German measles. They do not quickly come to a bladder and break, but resemble those so-called "blind boils" which are prone to form about the face and neck of persons in early manhood.

Treatment.—Clean and disinfect saddlery and harness. Apply to the spots or "buncles" saturated solutions of carbonate of soda or potash, or washing powder, or borax and glycerine, and if such mild measures fail an ointment of sulphur iodide. Also give rather large doses of sulphur internally for a week or more.

The more drastic treatment of a drop of pure ("neat") carbolic acid on each pimple is most successful, although it may leave a ragged ulcer for a few days; the healing is complete, and the re-formation of a pustule unlikely. Dealers often cure it by piling on rugs and making the patients sweat profusely. This ripens or ruptures the "buncles," and, once broken up, by whatever means, they disappear. This disease is infectious.

ITCHING—SOME CAUSES OF THE TROUBLE.

Itchinesses is not a word found in veterinary pathology, but expresses conditions of skin which fall under no special heading. There is itchiness under the bridle of the working horse which the patient slave may endure for long, but in some moment of exasperation rubs his bridle against a fixed object, pulls it off, and perhaps takes fright and bolts.

The itchiness under the collar and saddle or harness pad and that under the crupper are of the same character. They are not eruptive or coming from overheated blood, as we call it, but most commonly the result of sweating and drying without washing, grooming, rolling, or rubbing. Sweat contains salts in solution, sometimes irritative matter, which should have been passed by way of the kidneys, but at all times salts, which in the natural course of things would undergo desiccation or drying—falling off or being rubbed off by rolling in the field, or washed and brushed off by the good groom. With the working horse, and in summer time on the farm, everyone is, or should be, putting his best leg forward and doing a good day's work without thinking of much grooming, and so it is that the farm horse upon whose head and face the dried sweat accumulates is made to itch by dried ridges of it upon the bridle if not upon the animal's own skin. Such is the origin of most of the sores about the head, under the collar pad, and crupper. With more summers behind us than in front, we can recall many serious losses occurring to farmers through neglect to wash with soap and water the under surface of harness, or to sponge the honest face of "Vi'lut" or "Di'mond" after a hot day's carrying of hay or corn.

Itchinesses of this sort unfortunately lead to worse things, and when once a moist sore is set up flies are attracted to it, and then "Smiler" throws his head round and perhaps tears his eyelids upon a shaft hook—"perhaps," I say, but I might count up ever so many that have so happened, and to which I have ministered, surrounded by flies, which seemed ready to eat me and the patient too, with their appetites once whetted for living discharges.

ITCHY TAIL.

Going to the other end of the animal, we find itchy tail, but I do not put this down as a summer complaint, or as the result of sweating, for I never saw sweat on a tail yet. It will run down from the crupper and divide into little streams or lines of sweat, but it does not come from the tail. This form of itchiness is due to accumulation of thick scales or desquamation of the cuticle which is incomplete, and so accumulated layers are superimposed.

Horses with itchy tail will seek a fence if free, or a stall post in the stable, and soon disfigure themselves by rubbing, breaking off the coarse hairs at the roots, which will take a year to grow again if the itching ceases, and never if it continues.

It is not always the tail that does itch when a horse or a bullock rubs it; it is often enough the bowel and region around the anus itching from the presence of worms, and any treatment for itchy tail should include syringing out the rectum with an ounce of salt and a quart of water, and a day or two later introducing half an ounce of mercurial ointment. The tail that is rubbed and apparently itchy should be relieved of the layers of greasy scales which will be found in all but the finest-skinned and best-groomed animals. Abundance of hot water and a liberal use of soda—or, better still, extract of soap—will remove the scales with the aid of mane comb and dandy brush. When half dry, a sedative lotion, consisting of hydrocyanic acid one drachm, liquid potash four drachms, and water one quart, may be applied, and repeated after successive washings. If the animal's appearance is not of much consequence, an ointment may be rubbed in in lieu of lotion, but a greasy tail accumulates dust and looks very dirty. It may be composed of one part of nitrate of mercury ointment to twenty parts of lard. In applying anything to the skin of the tail, it is necessary to hold it well up and rub the ointment or lotion against the natural fall of the hair, or but little of it will reach its destination.

ITCHY LEGS.

Without any definite diseased condition, such as grease or cracked heels, there is often an itchiness which disturbs the repose of working horses. The subject of it rubs one leg against the other, or, using the foot with its iron shoe, induces a small sore, which becomes a big one as dirt and flies settle upon it. This itchiness in the legs of hairy horses is very much the same as that of the tail, and the same treatment is suitable; but, should the rubbing be that of incipient grease, warm water and soap will not be desirable. With the grease invasion there is usually some spot more advanced than all the rest, and having more or less of that offensive smell which is diagnostic. The hand rubbed over the doubtful leg will be evidence to anyone with a nose fit for useful service (*see* Grease and Leg Mange).

ITCHING EARS.

Farm animals enjoy comparative immunity from ear troubles, beyond hanging up occasionally in a nail, or getting bitten or stung, but the dog and cat are both predisposed to itching caused by the presence of little white mites (*symbiotes auris canis et catis*), and when they have tickled enough to

make the victim strike his ear with his hind foot, and the latter habit has spread the inflammation, canker follows. Itchy ears of dogs and cats should have some camphorated oil poured in for two or three nights in succession. (*See* Canker of the Ears.)

Since the earlier editions of this work were published, it has been demonstrated beyond all doubt that horses are frequent victims of a similar parasite to that above described, and the writer attributes those previously unaccountable cases of violent shaking of the head to their presence. Every horseman reading this note must have been troubled at times with horses which for no apparent reason would frequently shake the head as if to get rid of the bridle. How often I have got down to alter a buckle and look for a cause of discomfort about the animal, and failed to find it! Treatment similar to that advised for dogs and cats has been followed by the happiest results.

Chapter XII

PARASITES AND PARASITIC DISEASES.

The importance of the part played by parasites is even yet not realised Some of the most talented and industrious men in the medical and veterinary professions have given their lives to the study of parasitism, and published, for our guidance, the valuable results obtained, and still the farmer and stock-breeder suffers seriously from largely preventable parasitism.

It is not possible in a work of this character to devote a quarter of the space desirable to the subject of worms or parasitism; we can only take a general view of it, and such a practical classification as will enable the reader to choose what treatment to adopt and remedies to select for particular groups of parasites.

The most serious consequences have resulted during late years from the multiplication of a little red worm less than half an inch in length as a rule, and frequently not seen, owing to its minute proportion, and known by the name of Strongylus tetracanthus. Many districts have been rendered "horse sick" by it, and the losses among colts a year to three years of age have been so serious as to make many give up breeding. Treatment is not so successful as with other worms which chiefly inhabit the alimentary tract.

Thymol, a principle obtained from garden thyme, has been found a good vermifuge, but was at first prescribed in doses much too small, and experiments conducted at the Royal Veterinary College were very disappointing. If twenty to sixty grains are administered on an empty stomach, excellent results are produced. It has first to be dissolved in spirit, and then, mixed with milk, is given as a drench. During the war, when it was not obtainable, we advised a handful of chopped garden thyme in another of meal, and this was well reported upon by many correspondents.

It has to be remembered that all creatures which live in a fluid medium are of uncertain habits in the matter of food (ask anglers), and what one man swears by as a remedy, another swears *at*. In the case of the strongyles there is another reason. They are not always in the digestive canal, but bore through the sides and wander to other parts. The doctor with his drugs, then, may call when they are "not at home." If the droppings of colts affected are turned over and careful search made, it may so happen that no worms are to be found on that particular occasion, and on another day they will be passed in great numbers. This shows us the necessity of persistent war upon them. We may give our thymol or turpentine and oil, jalap, calomel, chenopodium, and other reputed worm killers, but we should also administer in the food every morning such substances as are

objectionable to the parasites but tonics to their unfortunate host. These we find in salt, iron, and gentian, of which a teaspoonful of the two first, and two of the latter, may be reckoned a dose for a two-year old; rather less for a yearling. If we can reduce their numbers and feed up the victim, he will win out or make good in the end.

Prevention is still more important. Having regard to the habits of the worm and his need of an equine host, we remove all horses, asses, and mules entirely for one year, or more if suitable arrangements can be made. Cattle and sheep may be grazed without risk while the strongyles die out.

This advice is not given in ignorance of the fact that one's system of farming cannot be changed and chopped about at a moment's notice, but the reader afflicted with sick land is earnestly desired to consider if he may not make changes such as the writer has seen, to bring about the happiest results.

The strongyles, of still more minute proportions, which are the cause of the Lincolnshire lamb disease and other inflammations of the stomachs of ruminants, must pass through periods in which they cast their skins: some of them several times, and like "soft" crabs, are susceptible to very little pressure at certain seasons. Soot and salt may be advantageously rolled in, when the surface of the ground is dry, and if the barometer is backing so much the better, for a shower will complete the work. For these minute strongyles in the ox and sheep, tobacco seems to be the best remedy as yet tried. All the reputed anthelmintics have been experimented with at the veterinary colleges and have failed, but a few bold amateurs have claimed great results for tobacco; some giving it rolled up in paper, and others infusing it in boiling water and drenching. So far as the writer is able to ascertain, it would appear that a sheep can take something like a drachm of shag and a beast about an ounce without danger.

Nematoda. Round and Thread Worms.

ASCARIDES.

Ascaris megalocephala is the large round worm most often found in the horse, and its habitat is the stomach and intestines. It is dislodged without much difficulty by means of drachm doses of santonine for two or three mornings, followed by a full dose of aloes (*see* Physic). Sulphate of iron in one to two-drachm doses in the food, and a like amount of common table salt, are found to keep down these ascarides.

Ascaris suilla in swine is to be disposed of by similar measures to the above, apportioning the dose as per Table of Doses.

Ascaris marginata and mystax are round stomach and bowel worms which most often infest the dog and cat. It is desirable in all animals to have an alimentary canal as empty as possible, if the full effects of worm medicines are to be got; but with the many-stomached bulky ruminant we cannot get these conditions—we do the best we can by a day's fasting. With dogs and cats we can ensure an empty stomach, and bowels containing but little, we may even purge them first and give our anthelmintic remedy after—a very good plan in cases of old-established parasitism where remedies have previously failed.

Ascaris heterakis and others are found in poultry and pigeons, and may be got rid of with the remedies previously mentioned.

Trichina spiralis occurs in the flesh of swine and is not often met with in the British Islands, but persons eating such meat are liable to trichiniasis.

Horses and cattle bear fairly large doses of turpentine with skim milk, given in the morning fasting, and this is one of the most effectual remedies for the great ascarides.

Aloes as a ball, from four to eight drams, is perhaps the most successful of all horse remedies for the great white worms which occupy the small bowel and must need a large amount of sustenance, although many horses sustain them and keep in good condition themselves. As a matter of calculation it will be cheaper to give a physic ball than to supply food for these large worms, whether or no they appear to be doing harm to their host; besides which they are always producing ova for the infestation of other horses which may suffer more from their presence.

Salt, arsenic, sulphates of copper and iron, and tar derivatives, as creolin and lysol, are also employed.

For dogs and cats, santonine and iron, followed by an aperient of jalap, is almost invariably successful. Should it fail, oil of male fern may be used, but this substance so frequently excites vomition as to be lost before its effect can be produced, and an excellent preparation is now to be had containing the active principle together with that of areca nut. The last named is of very doubtful value for any of the round worms.

OXYURES.

Oxyuris curvula and mastigodes are the whip worms most found in horses. They are only an inch to three inches long and have a dark-looking mark down the course of the intestine, due to the nature of their food; they are what is known as dung feeders—that is, feeding upon the contents of the alimentary canal, and not sucking the membranes or deriving their chief substance from the already digested food or blood of their hosts.

The oxyuris vermicularis is found in the dog. This class of round worm, although largely resident in the last gut (rectum), and for this reason get-at-able with drugs, is difficult to eradicate. The remedies most advocated are injections of warm vinegar and water (equal parts), table salt in the proportion of one ounce to one quart of warm water, 4 per cent. creolin solution, 5 per cent. carbolic acid solution, infusion of quassia of the strength of four ounces in half a gallon of boiling water, infused for an hour and strained. It should be quite understood that no carbolic acid or preparation of tar or its derivatives should be given to *dogs or cats*: creolin is therefore barred as far as they are concerned.

STRONGYLES, STRONGYLI.

These are round worms, but with anatomical peculiarities which distinguish them from the classes previously mentioned. Some of them inhabit the digestive tract (*a*), and some the air passages (*b*). The best known are included among the following:—

(*a*) Strongylus armatus and tetracanthus, in intestines of the horse.*
Uncinaria radiata æsophagostoma inflatum of cattle.
Strongylus contortus, cervicornis, gracilis, and others, in fourth stomach and intestine of sheep and goats.
Uncinaria trigonocephala, dogs and cats.
Strongylus tenuis and nodularis in poultry.

(*b*) Strongylus micrurus, in air passages of young cattle, sometimes of horse and ass, but rarely.
Strongylus filaria, in air passages of sheep, goat, and camel.
Strongylus rufescens, in lungs and bronchi of sheep.
Strongylus paradoxus, in swine.
Unidentified species in cats and dogs.

Syngamus trachealis or Sclerostoma syngamus, in poultry and wild birds.

* Red Worms in Colts.—Mr. G. W. Gale, of the Royal paddocks, has found a "measure" ful of Lysol (sold with bottles) in half a pint of separated milk, to answer well.

Treatment of animals suffering from strongylus. –Those affecting the digestive tract, and named above, must be attacked by fasting the host for a period of twenty hours or more, when turpentine, santonine, and thymol, thirty to one hundred grains, are the most approved remedies. (*See* Table of Doses.)

The strongylus contortus of sheep is best treated with a 1 per cent. solution of lysol.

Dogs and cats should receive santonine, male fern extract, areca nut-powder, followed by an aperient of jalap or castor oil.

The strongylus micrurus is the cause of husk. (*See* Husk.)

FLUKEWORMS, TREMATODA.

Distoma hepaticum, a sole-shaped worm, is the cause of liver rot in sheep, hares, and rabbits. (*See* Rot.)

There are a number of these worms in other animals, but they are of no special importance to the farmer and stock-breeder.

TAPEWORMS, CESTODA, TÆNIÆ.

All the domesticated animals, as well as poultry, are subject to one or more species of tapeworm in the adult or final stage of its cycle in life.

Tænia perfoliata, plicata, mammillana, in horse.

Tænia expansa, denticulata, and alba, in cattle.

Tænia expansa, in sheep and goats; very destructive to lambs in some seasons.

Tænia cucumerina (the commonest), serrata, marginata, cœnurus, echinococcus, borthriocephalus, in dogs and cats.

Tænia infundibuliformis, in poultry;

and others unnamed.

All the tapeworm tribe pass through the stages of egg, cyst, and mature tapeworm, before reproduction takes place, and more than one host or bearer is necessary to complete the cycle of life. The so-called measles of beef, pork, and mutton are due to the larvæ of tænia. Each produces its particular tapeworm. The cystic form may be passed in the substance of the muscles as above, being a very small cyst, or even in the body of the dog louse or flea, as in tænia cucumerina; or in the case of the larger cysts, attached to the viscera of rabbits, or as a watery bladder in the brain of the sheep, and causing the malady known to shepherds as gid, sturdy, and turnsick. We may take the life of this particular tapeworm as typical of the changes undergone by the rest of the species.

GID IN SHEEP, ALSO CALLED STURDY, TURNSICK, ETC.

From each segment of a mature tapeworm as many as 30,000 eggs may be passed out upon the grass when the host (usually a dog) evacuates the rectum. Out of the countless millions of eggs so passed daily a few get taken into the stomach of the sheep upon the grass eaten by them. The digestive juices have the effect of dissolving the shell of the egg, and a six-hooked embryo is liberated. It fastens upon the mucous membrane, and with its special apparatus bores a hole big enough to admit of its passage into the nearest blood-vessel, and so launches into the blood stream. A subtle instinct tells it where to cast anchor. The brain is the home it desires, and here it stops, and by its presence as a foreign body sets up a form of inflammatory action resulting in the formation of a cyst or bladder, upon the inner lining of which the future heads of tapeworms form. No further development takes place in the brain of the sheep, and if the animal does not turn giddy and have to be killed—if, that is to say, the pressure of the

cyst is not so great that the brain cannot gradually accommodate itself to its presence—the sheep may live on and the cyst find no further development, but in time, as in the case of some broken-mouthed ewes infested in early life, may undergo degeneration itself, and become sterile, even if placed in a suitable environment. What more frequently happens is that the sheep is killed, the brain is found unfit for sale for human consumption, and cast to the dogs or into the pig bucket. Here, then, is the complete cycle, for when the dog swallows the cyst with the heads of tapeworms already formed they have nothing to do but fasten on to his intestine and grow fresh segments. Some of the tapeworms, notably the commonest of the dog, the cucumerina, will arrive at sexual maturity in three weeks.

Dogs infested with fleas and lice bite at and swallow the cysts, and so keep up the round of reproduction upon their own bodies. The bladders found

FIG. 53. SHEEP WITH GID.

in rabbits adhering to the bowel are too often given to or picked up by sporting dogs, and in this way infestation with the tænia serrata is frequent in this class of dog.

Treatment.—Previous fasting is of the utmost importance with all animals. Horses, cattle, sheep, and pigs are best treated with oil of turpentine in which oil of male fern has been mixed with areca nut, and the whole shaken up with milk. A dose proportioned to the animal (*see* Table of Doses) may be given on three occasions, and after the last a fairly strong aperient (*see* Physic).

Dogs and cats are subject to many more tapeworms than horses or ruminants, as they are not such clean feeders. For the same reason pigs fed upon offal and swill are prone to worms, both of the round and tape varieties. Dogs and cats may be given freshly ground areca nut, either in powder or pill form, in the proportion of two grains to each pound weight of the patient, or kamala in like proportions.

A few griping pains may be disregarded, as it is important to get rid of the worms at once, and failure on the first occasion necessitates repeated dosings. The author is under the impression that tapeworms which have successfully

resisted vermifuges on previous occasions acquire a certain degree of immunity to their effects. The ripe segments of tapeworm will be found upon the parts under the tail of a dog, affording the most conclusive proof of his infestation, yet areca nut will often fail of its purpose. In another dog the first dose will expel the worms, with violence, so to speak, and if the patient has never experienced such a thing before he will be very much frightened. We must not then be easily convinced that a cure has been effected, for tapeworm is most persistent, and so long as a segment or two has been left behind we may be sure it will grow again.

Many dogs and cats are infested with a variety of tapeworm known as bothriocephala, by access to the offal of fish, and as fast as they are cured of one batch of worms another is matured within them. Something like 70 to 80 per cent. of dogs in England are infested with tapeworm, and a still larger proportion in Norway and Sweden, where fish is the staple diet.

For what may be called chronic subjects of tapeworm we should prescribe a longer fast, abstinence from water, a larger dose of areca, combined with turpentine (made safe by admixture with milk) and followed by an aperient, preferably jalap, as this is seldom vomited, and is in itself a worm killer, and too much for some of the old stagers which have resisted all previous efforts at ejectment.

Much trouble has been experienced in getting rid of tapeworms in lambs.* They do not readily succumb to areca nut or male fern or the other remedies so successfully prescribed for dogs and swine, and lambs will not bear very large doses of turpentine. Hogs may have two to four drachms in a wineglass of linseed oil, with ten to twenty drops of extract of male fern, but the writer's experience is in favour of persistently using iron, salt, and gentian in trough food. None of these drugs can be said to kill the worms outright, but they have a hardening effect upon them which causes them to lose vitality, fail to propagate, and finally to shrivel into material resembling leather. A few doses will not do it. Perseverance is essential to success. Fortunately the ingredients of this compound are all so cheap that cost need not be considered.

All worms and soiled bedding should be burned, and infection avoided from the various sources above pointed out.

ROT IN SHEEP, LIVER ROT, THE ROT, COATHE, BAIN, ETC.

By the above and other names the malady is known which for ages has afflicted sheep, and at various periods brought ruin upon flock-masters the world over. The dry and arid parts are least affected—the rich water meadows the most—and for reasons which will presently appear when we enter into the life-history of the parasite. Belonging to the order of Trematoda, or flat suctorial worms, it has a wide range, but passes through seven stages, of which six are outside of the sheep. Each fluke has male and female organs, and is capable of producing large numbers of eggs. The mature fluke resides in the tubes or bile ducts of the host (sheep or other animal), and ejects its eggs into the channel, whence they are carried into the intestine, and out upon the ground. It has been estimated that a well-favoured mature fluke will produce 40,000 eggs. The eggs are about 1-180th of an inch in length, and 1-300th of an inch broad. When large numbers have accumulated in the partially blocked ducts, they can be felt as gritty substances, under a knife pressed flat upon the bile products, and seen by a low-power magnifying glass, if not with the naked eye. This manner of their distribution in the dung upon the ground is of the utmost importance,

* A large number of flockmasters have reported favourably on the following doses given once a week: Arsenic one grain, fifteen grains of Carbonate of Soda, ten grains of Sulphate of Iron, ten grains of Quinine—as a compressed tablet.

because one may have sound land ruined by the introduction of a single rotten sheep. A hundred flukes may be distributing three or four millions of eggs, and as many as two hundred flukes have been counted in one liver. For the next process of development a moist place and moderate temperature is necessary for the production of an embryo. Upon the dry and sandy soil the eggs perish, and hence the comparative immunity of some countries, and the permanent infection of others, where the conditions are favourable, in the sense above indicated. The embryo is covered with fine hairs, if they may be so called. The scientific name is celiæ. The ciliated embryo, with a boring apparatus, bores its way into a snail. Linnæus truncatulis is its special host or first bearer. In the body of the snail it develops into a sporocyst. The sporocyst dividing into two, gives life to another generation or phase known as rediæ. These again grow into creatures with tails, and resembling tadpoles, and are known as cercariæ, and, being in this stage independent of the snail, make their way out and fasten upon the grass, themselves producing a sort of protective envelope by which they are attached to the grass, and by which they will be conveyed unharmed into the stomach of the ultimate host, the sheep, deer, or other ruminant. But this particular fluke's destiny is the liver of the sheep. It is endowed with the instinct to seek the safe seclusion of the biliary tubes of the liver, where it may be assumed that it finds exactly the food, shelter, and warmth required to mature and reproduce in the same manner as its forbears, and as we have sketched.

Those persons who ask for a "cure" should seriously consider the life cycle of the pest, and the impossibility of getting any remedy in contact with the fluke that would not first kill the bearer or host. It will be evident to the reader who has followed the life-history that prevention is what we must aim at. One sheep does not infect another directly, but drops the eggs about wherever he goes, and these find snails, and so on, until the cercaria stage is reached, and another sheep swallows it. Given perfectly free sheep and clean land, the breeding of sheep might go on for ever without contracting the rot; but introduce a single example of mature fluke in a gimmer, and a wet season will permanently infest the land, provided that the particular snail is present.

These conditions, then, are necessary: namely, the presence of the eggs; moist and warm situation for development of the embryos; the special snail and the sheep to devour the cercariæ after they have left their "nurses," as the latter are called. If we can break the chain we can stop reproduction. It has been shown already how a warm, wet season favours the hatching of the eggs, and we all know that such seasons favour the intermediary bearers, the snails. We may take comfort from a particularly hot dry season in that the eggs die, and never hatch out if exposed to sufficiently dry air. It is the drying that they cannot survive; their sides fall in, and they wither away. We know, too, that the snail tribe are shy of heat and drought, and so it happens that on a hill farm or bare pastures, where there are no ditches, the plague almost disappears at times.

The nature of the soil, too, has much to do with it. On a porous sandy soil eggs washed away by rains from the sheep's dung are left stranded on the top, while the water filters away through the ground. They die then from exposure to the sun and desiccation. On a stiff clay the eggs are carried away into ditches and moist places, there to develop; hence the need of throwing the ditches and destroying the sedges and other water plants on which the cercariæ and their nurses may hide. It is believed by helminthologists that the snail previously named is the only one in this country in which flukes pass their intermediate life, and that if we could destroy these the disease might be altogether arrested. It may be asked

why in the spring the disastrous results of fluke are so manifest, and the answer is that the embryos hatched in the autumn found homes in the snails before the latter buried themseves for the winter, and that with the lengthening days after Christmas these come out, and the cercariæ leave their homes to attach themselves to the grass within those protective envelopes before referred to.

Long before the life-history or cycle of the fluke had been discovered sheepmen had become aware of the immunity of flocks pastured on salt marshes, and checked the progress of the malady by sending inland sheep on to such sea-flooded land, and that without injury to the marshes. The reason is that the snail is essentially a land or fresh-water creature, and no matter how many embryos might hatch in the warm and moist days, they would find no snails in which to burrow and develop into cercariæ. It has been proved that this snail (Linnæus truncatulus) perishes in a 1 per cent. solution of salt—a proportion which can be freely employed on pastures without detriment to the tenderest plants. We know, too, that soot is particularly disliked, and even fatal to snails, when it is impregnated with the products of coal combustion. Twice a year a good dressing of salt and soot will enable us to keep so-called "rotten" land fairly free from the nurses without which the cercariæ cannot be reared. In the autumn the dressing is designed to kill the snails before they lay up for the winter, and in the spring to intercept them before they can do any mischief.

Symptoms of Rot.—These develop very slowly as a rule, and flukes are often found in the livers of sheep at the slaughter-house which have been killed in good flesh and without suspicion of rot. During the early period the presence of flukes stimulates the liver to secrete more bile, and this increases the digestive power, so that the initial stage of rot has been observed to be actually beneficial, and certain sheepmen have taken advantage of it to force on mutton for market. As the number increase and their eggs and débris, with semi-crystallised bile products, block the channels, there is seen wasting, pallid membranes, the eyes and gums looking bloodless, the liver enlarged, the appetite variable or lost, the sheep grows weak, watery swellings are found under the jaws, the belly is increasingly large, and the muscles of the loins so wasted as to give the animal a "razor-backed" appearance. The fleece comes out easily, as indeed it does with any wasting disease, but it is a marked feature in liver rot. As the weakness increases and the belly enlarges, the breathing becomes short, and the animal distressed by the least effort to get about. Ewes frequently abort. If the liver of a dead sheep is examined it will cut with a gritty feeling, and the ducts will be found much enlarged and containing flukes of different sizes, bile products, and ova.

The question of a natural cure is sometimes debated, because affected sheep have been allowed to survive, undergo a slow period of convalescence, during which the parasites leave the host they have treated so badly, but the structural changes which have resulted from their tenancy leave the animal's functions so impaired that a return to health is well-nigh impossible in any but a small minority.

The throwing out of ditches is attended with the depositing on the banks of many water snails, and the mud and vegetation so deposited should be rendered harmless by covering it with gas lime. Droppings of sheep known to be affected should be spread by the chain harrow, so that the greatest number of eggs may be killed by the sun and wind. Rock salt should be placed in all feeding troughs, or a teaspoonful of table salt served to each sheep in the ration daily. The land should not be overstocked nor fed too bare, shifting to higher ground whenever practicable.

Ewe flocks should not be kept on flukey land at all, but only sheep intended for slaughter within a year. Buyers should not obtain sheep from fluky flocks or land. On suspected land, or in a flock where one or more show doubtful symptoms, the flock-master should not hesitate to butcher, and ascertain, by examination of the liver, what is the probable state of the rest of the flock. Great loss may be saved by a timely recognition of the disease, for, as previously stated, sheep will at first put on flesh, and this is the time to dispose of them to the butcher. The livers should be cooked before feeding to dogs, or live eggs may pass through them and again seed the land.

Medical treatment of sheep once affected does not offer much hope, but it has to be remembered that two to three months may pass from the time the pupa enters the liver before any effect upon the health of the host is noticed; indeed, it has already been observed that the early excitation of that organ causes the victim at first to thrive. It is later when their mischief is produced. If, then, it is discovered in a flock that two or three have fluke, and the whole number have been living under similar conditions, a pretty good guess may be made that fluke is prevalent among the remainder, and it may prove good policy to force them for the butcher while they will respond to the whip, and, if only in fair condition, kill them rather than suffer a greater loss by their retention. There will, of course, be many degrees of infestation, some too badly stocked with flukes to have any chance of recovery, others impoverished, but capable of weathering the storm if well "done" and given salt and iron and gentian, or other suitable blood builders and tonics. In the case of ewes heavy in lamb before the mischief is discovered, the above treatment offers the best, indeed the only, alternative to entire loss.

In conclusion, one would impress farmers with the value of salting twice a year, and remind them that the little red worms which infest and even kill colts, and the huskworms which do so much damage to calves and lambs (*see* Strongyles and Husk), and the bearers of tapeworms, may be swept away with the same destroyer as the flukes. If chloride of sodium has no great manurial value in itself, it has such immense indirect advantages that its cost should not weigh with the agriculturist.

HUSK, HASSE, HOOSE, HOAST, PARASITIC BRONCHITIS.

The worms which cause this disease are mentioned in the group to which they belong (strongyles).

Calves and lambs are the chief victims of the disease, but ruminants of any age may be the hosts of the strongyle, and wanderers are found sometimes in such distant situations as heart, blood-vessels, and intestines; the smaller

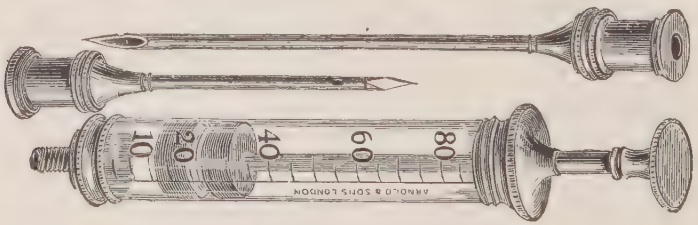


FIG. 54. HYPODERMIC SYRINGE.

bronchi are their natural habitat, however. Weaklings are very easily pulled down by the effects of these parasites, which cause constant irritation and distress, from a bronchitic cough, which their presence sets up and maintains until got rid of, or by voluntarily quitting their abode at the appointed season.

Post-mortem examination of cows has revealed old nests of strongyles in the bronchi which have accounted for the husky cough attributed in them to tuberculosis, and the writer is of opinion that this is a much more frequent cause of cough in adults than has been suspected. The treatment advised for calves applies equally to grown cattle, and a larger intra-tracheal dose may be given for any chronic cough, with safety.

Calves and lambs pastured on low-lying meadows, and upon clay and retentive soils that are not necessarily low, are liable to husk, more especially in the time of heavy autumn dews. There are practically two seasons for the huskworm, a spring and autumn, but the severity of the attack is so generally confined to the autumn months that we hear but little of the spring trouble, or it is attributed to east winds or unsettled weather.

Symptoms.—The common name of husk or hoose is descriptive of the chief symptom. It is a soft or husking cough, prolonged as if with the object of coughing up some deep down accumulation, as indeed it is, for in the smaller bronchial tubes the strongyle loves to disport himself. There is some frothing and slavering at the mouth, or foam hanging round the nostrils, and more or less distress, according to the length of time the animal has been suffering and the numbers of the invaders, as well as strength and stamina of the host.

Treatment.—This should not be attempted by the barbarous method of drenching through the nostrils, but where young stock are sufficiently bad to require severe measures a veterinary surgeon should be asked to inject remedies into the trachea. There is no special art in this, and a good many stockraisers now practise it.

The syringe should be kept in a perfect state of asepsis, and when used the needle should be pushed through the skin and windpipe, about halfway down the latter, where there is least tissue covering it. The direction of the needle should be downward, avoiding puncture of the opposite side of the pipe. The fluid in the syringe is then slowly injected into the lungs and the instrument withdrawn. The following is a well-tried mixture for the purpose, and the quantities given constitute a dose for a full-sized calf, less being required for lambs and small calves :—

Oil of turpentine	2 drachms.
Carbolic acid (pure)	20 drops.
Chloroform	30 drops.

Shake well at time of using, and inject before separation takes place. Mr. Wallis Hoare, F.R.C.V.S., in his "System of Veterinary Medicine," gives the following recipes :—

(1)

Spirit of turpentine	2 drachms.
Laudanum	1 drachm.
Carbolic acid	20 drops.
Olive oil	2 drachms.

One dose every second or third day.

(2)

Oil of cloves	3 ounces.
Oil of turpentine	3 ounces.
Olive oil	2 drachms.
Carbolic acid	2 drachms.

Of this mixture, give two drachms for a dose.

This method of treatment has proved so successful as to have supplanted others among veterinarians, but fumigation has its merits, and consists simply in confining the subjects of the disease in a comparatively air-tight chamber, while compelling them to inhale gases calculated to destroy the parasites, as

well as provoke such coughing as will lead to their ejection; the latter is probably the chief manner in which the patients are benefited, as any sufficiently strong inhalation would kill both host and guest. Chlorine is liberated by the action of sulphuric acid on a mixture of chloride of sodium and black oxide of manganese, or on bleaching powder (so-called chloride of lime). *See* Disinfectants.

The burning of sulphur and liberation of sulphurous gas is a cheap and easy process. Sulphur is placed in a flower pot or other fireproof saucer saturated with methylated spirit of wine, and set alight. Until the spirit is all consumed it will continue to burn (and a little longer), giving off dense masses, which will choke the worms, the animals, and the men who go inside the building, if they are not very careful. Carbolic acid poured over a red-hot shovel and in a confined space is also employed with more or less success. Next to the intra-tracheal injection the writer has met with the greatest successes by the internal administration of turpentine, carbolic acid, and asafœtida with linseed oil. Here again caution must be used. We may give a lusty calf of a year or fifteen months as much as a drachm of carbolic acid and an ounce of turpentine, together with half an ounce of tincture of asafœtida and half a pint of linseed oil, with safety and excellent effects, but the same dose given to a weakling of six or eight months who has had scours half his time would prove dangerous. Half the above would be a fair dose for small and weakly calves, and a quarter of it for lambs, or even less. The affected animals should be got into a house over night and kept empty until an hour after they have had the medicine next morning; then allowed to run out, and the floors swept and the litter burnt. This dose may be repeated twice or three times at intervals of four or five days.

The Irish Department of Agriculture recommends the following treatment of husk, which is so prevalent in herds at certain times of the year. Calves in poor condition are very liable to suffer. The treatment is, twice daily to each affected calf, one-and-a-half teaspoonfuls of a mixture of one drachm of oil of cloves, three ounces of spirits of turpentine, and twenty-four ounces of linseed oil.

Prevention is to be attempted by keeping the young animals yarded until the sun is up and the dew off the grass, as then the worms seek the shade and are not so likely to be taken into the animals' stomachs.

Salting the pastures heavily both in early spring and autumn is the best of all preventives. If done liberally and efficiently, the husk worm will be eradicated. The value of the salt will be returned many times, and enhanced if soot is sown with it.

BOTS, ÆSTRIDÆ.

Horses, cattle, and sheep are subject to the attack of flies, whose object is to deposit eggs which shall, when converted into grubs, find a home in the tissues or cavities of the host.

The female *œstrus equi* deposits yellow oblong eggs about the forelimbs and sides of horses at grass or upon country roads (they are rarely seen in large towns), and from this position they are licked by the animal and conveyed into the stomach, where they undergo further development and become attached as bots (Fig. 55) until the following summer, when they voluntarily quit their hold and pass out of the bowels on to the grass, there to undergo the chrysalis stage, and eventually become flies, male and female. This constitutes the cycle of life, and if we would prevent them we must aim at destroying the eggs by rubbing them over with a paraffin rag, or some tarry preparation which will either destroy the eggs or prevent the host from licking them.

FUNDAMENT BOTS.

Another species of bot fly deposits its eggs on the folds of membrane, during the act of defecation, and the grubs (bots) attach themselves to the

FIG. 55. BOTS AFFIXED TO STOMACH (SHOWING METHOD OF ADHESION).

inside of the rectum, remaining until the following summer, when they change somewhat in colour and come away, pass through the same stages as above described in connection with stomach bots.

Treatment.—Many fundament bots may be detached by the groom if he watches for the same opportunities to remove the bots as the fly took to deposit her eggs. A smear of mercurial ointment inside the rectum occasionally will be safe and effectual, so far as it comes in contact with the parasites. Weak carbolic injections, and those of salt and quassia, may be here employed with some measure of success (*see* Treatment of Strongyles). Ever since Bracy Clarke first described bots and gave a lenient verdict as to their offences against their hosts, it has been too generally assumed that they are of no consequence, but the veterinary surgeons who have spent as much time at the knackers' yards as they ought, have seen stomachs riddled and wasted and finally giving way, owing to the presence of large numbers of bots.

Treatment of horses affected with bots in the stomach has hitherto been very unsatisfactory, as the creatures bury their noses in the mucous membrane and do not live upon the contents of the stomach; they are not likely to feed upon any poisonous substance addressed to them. Every stableman almost is convinced that he has a cure for bots, but his remedies are only found to act at the time of year when the parasites need no invitation to seek the

outer world. The most recent of remedies is bisulphide of carbon, in 75 grain doses, enclosed in gelatine capsules, and repeated in twelve hours, after which a dose of physic is given (*see* Physicking). The older

FIG. 56. THE BOT FLY. (DRAWN TO NO SPECIFIED SCALE.)

remedies are turpentine, hydrochloric acid, naphthol, iodine, copper, and iron sulphates. Many amateur horse doctors give arsenic and antimony in drachm doses, but on an empty stomach such quantities are considered dangerous.

THE OX WARBLE, OR BOT.

For some time past the Ox Warble Fly has been recognised as a serious pest in Great Britain. The enormous losses have now been somewhat reduced owing to the measures taken by farmers and graziers. The exact amount of loss cannot be gauged, but it must still be considerable, judging from the number of warbled beasts to be seen in parts of Great Britain. There is more than one warble fly concerned, the greatest sinner in this country being the Hypoderma lineata. "The damage caused by these pests is due both to the

FIG. 57. THE WARBLED FLY.* (DRAWN TO NO SPECIFIED SCALE.)

adult flies and to their larvæ or bots. The flies when on the wing, and on the look out for a host on which to deposit their eggs, frighten stock and frequently cause loss amongst in-calf cows, by making them stampede about the fields, and also do harm in other ways. The maggots or bots living beneath the skin perforate the hide, and ruin it when present, as they often are, in considerable numbers. They also cause loss to the butcher, who finds the flesh beneath the warbled areas so altered by the inflammation set up by the parasites in that region that the beef is spoiled. This so-called 'licked beef' has a straw-coloured jelly-like appearance in a newly slaughtered carcase, but turns to a dirty green in a few hours." When the bot is mature, it becomes greyish brown, with grey stripes, and is about an inch in length, the body being very spiny. By means of these spines the maggot makes its way out of the warble cell, and falls to the ground.

* Dressing used by Mr. E. Kennedy, of Straffan, and endorsed by Irish Department of Agriculture, consists of: Archangel tar and paraffin, equal parts. Does not injure skin or hair, and most of the grubs were found dead and shrivelled, and many were being worked out of their hole. Both the British and Irish Boards endorse Leeney's recommendation of two strong thumbs.

A period of three to six weeks elapses before the pupa hatches out into a fly. The female alone is the cause of trouble, the male apparently having no other office than assisting in reproduction. These flies are so sensitive to cold that they sit about in a state of torpor in dull weather, and during sunshine will not go under the shade of trees, hence the importance of affording cattle plenty of shade; water to which stock may run and enter also wards off these pests.

Most of us, with eyes in our heads, were prepared to swear that we had seen warble flies do their work on the backs of cattle with the special spear with which they are armed: indeed, we attributed the terror of the warble fly displayed by cattle to the fear of this wounding of the hide. A grave doubt has been cast upon our powers of observation, and we are told by the

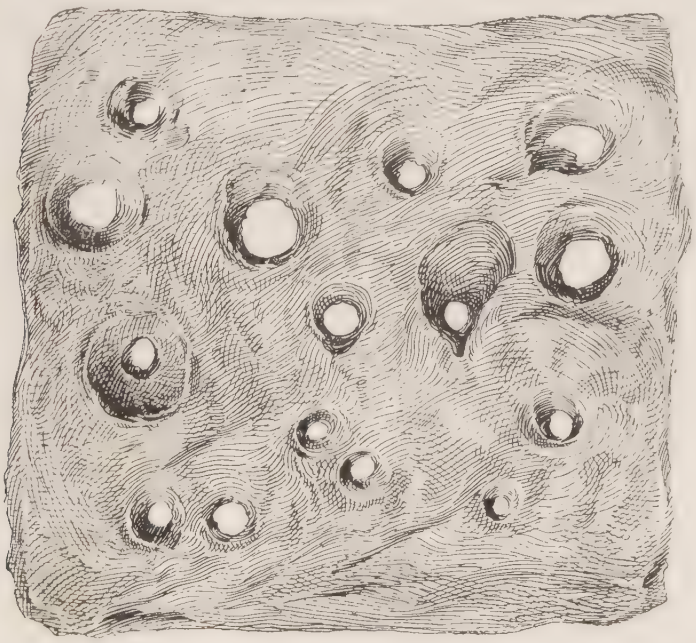


FIG. 58. PIECE OF WARBLED HIDE.

Irish Department of Agriculture and Technical Instruction that warble flies may deposit their eggs on the legs, be licked in by the ox, and that the grubs can work their way through a yard or more of various tissues in order to come up under the skin, when the fly might have used her special apparatus to deposit the eggs in the way we have been so long accustomed to believe. We also were under the impression that gadflies did not like fish oil or tar, and such like evil-smelling mixtures, but in this we have credited them with a refinement of taste they cannot claim, if the above-named authority's findings are to be accepted:—

> "(1) The various dressings that have been constantly recommended for preventing egg-laying by warble flies are valueless as protection. Calves and yearlings sprayed all over every day from June to September are 'struck' by the fly and have as many warbles the next spring as animals altogether untreated."

"(2) The smear made of train oil, spirits of tar, and sulphur is not only useless, but directly harmful when applied to calves, as it makes the hair come out and renders the skin sore. The train oil seems to be an ingredient that chiefly produces these effects. The smear does little injury to yearlings and older cattle unless used very frequently.

"(3) Contrary to common belief, the eggs are laid more frequently on the legs than on the back or ribs of the animals, and, from experiments with muzzled calves, the conclusion is arrived at that the maggots bore through the skin and do not enter the beast's body by the mouth.

"(4) As dressings applied in summer are useless, the Irish authorities strongly recommend the destruction of the maggots in winter and spring."

Such is the latest information obtainable at the time of going to press, but we "hae our doots," and for others unable to digest the new theory repeat what was said in the earlier editions of this work. There is one point the Irish authority agrees with us in, and that is the possibility of exterminating the warble in two or three seasons if we would all unite to kill the grubs in the skin where we can see them, however they arrived at their destination.

The flies may be deterred from laying their eggs by dressing the beasts at intervals of a month, from May to September, with some strong-smelling oil or grease. Cart grease and paraffin may be used for this purpose; another mixture found to benefit is one quart of train oil, four ounces of oil of tar, and four ounces of flowers of sulphur. Pure kerosene applied to the legs, back, and flank with a rag is also successful.

If animals are found to be warbled, the bots may be squeezed out of the swellings and killed during February, March, and April. The maggots may very easily be extracted by squeezing the warbles with both thumbs, and may then be squashed under foot. This is a better plan than covering the opening of the warble with grease or mercurial ointment, so as to suffocate the bot within.

Free leaflets on this subject are supplied by the Ministry of Agriculture.

SHEEP BOTS, AESTRUS OVIS.

The sheep bot is more difficult to dislodge than either of the horse bots, or the ox-warble, because its home is in the cavities of the head—the sinuses of the face. The fly lays her eggs close to the nostril of the host, and the grub instinctively seeks the nasal chamber, finally lodging in those places which make the skull lighter than would be the case if they were solid. In such a position any assault from outside is practically futile. It is a matter of some surprise that sheep are seldom inconvenienced by the presence of two or three of these grubs. It is only when unusual numbers take up their abode or trespass upon the more sensitive regions that the host appears to suffer seriously by their presence. Frequent sneezing and snorting may, in a few instances, dislodge the bots, and snuff and hellebore root ground and given as a snuff have been recommended. Steel also advises fumigating with tar and sulphur, and the injection up the nostrils of turpentine and glycerine. We may conceive of cases of very valuable pedigree animals where it may be worth while to trephine the facial bones and evict the bots with certainty, but in the ordinary flock such performances will not pay, and our chief efforts must be in the direction of prevention.

Smearing the nostrils with fish oil or tarry matter prevents the fly from settling. A convenient method of application suggested by Mr. Walker is that of placing salt or other favourite substances in troughs, covered with a lid, having two-inch auger holes, around which tar is smeared, so that animals cannot get the contents without tarring themselves in the region desired.

WOODEN TONGUE, ACTINOMYCOSIS.

This is one of the so-called new diseases, because it was only recognised some sixty years ago. It is due to the introduction into the animal's body of the ray fungus, probably through some little abrasion of the mucous membrane. It chiefly affects the tongue and jaw-bone of cattle and the udders of sows. Its frequency in the tongue, and the loss of mobility caused to that organ, give rise to the common name of wooden tongue.

Symptoms.—The affected animal is noticed to dribble or slaver, perhaps drop the food when partially masticated; to lose condition and champ the jaws, with mouth frequently part open; indeed, the difficulty of mastication is commonly so patent that the stockman cannot fail to observe it. If the mouth is opened, the tongue or membranes of the mouth will be found to have small tumours in or upon them, with a disposition to break through the surface and discharge matter or blood, or both. These granulomata may be so numerous in the soft substance of the tongue that the organ is practically useless, and the hapless beast starves, unless fed upon food he can suck up from a manger. The glands of the mouth and that under the ear (parotid) may any or all of them be affected, without the tongue being involved.

Treatment.—This is now generally successful, since it was found that iodine could be employed in large quantities, and for a length of time, without injury to the patient. On its discovery, no time should be lost in applying a strong tincture to the broken sores or nodules. A mixture of tincture of iodine with iodoform and carbolic acid and glycerine, equal parts, has been advocated. A drachm of biniodide of mercury with two of iodide of potassium in half a pint of water may be used as a mouth wash with which to sponge or paint with a brush all over the bad places. More important than the external dressings is the administration daily of large doses of iodide of potassium in solution. The ray fungus cannot live in the same body with iodine salts or iodine in any form, and the patient must be made untenable as soon as consistent with safety. It has been found that an average bullock of two years can take as much as half to one and a half ounces. It is well to begin with half an ounce for the first few days, but working up to a maximum, as soon as it is seen that no bad effects follow. There is generally some loss of condition before the treatment is begun, and in any case it is advisable to feed liberally on soft food that can be easily taken up in the mouth and properly dealt with. When the tumours are seen to be shrinking and the surrounding area resuming a natural appearance the iodide may be reduced by degrees, and finally left off altogether. Some of the tumours affecting the jaw and bulging it out are not so quickly disposed of as wooden tongue.

A less expensive preparation is mentioned in Mr. Wallis Hoare's *Materia Medica* "for actinomucosis (wooden tongue) in cattle, ten grains of the biniodide of mercury with an equal amount of potassium iodide, given three times daily, proves as effectual as the latter agent, while it is far cheaper." The writer has not found it so sure in action as the large and expensive doses referred to previously.

Many correspondents have had excellent results from the following:—

Iodide of potash	2 drachms.
Biniodide of mercury	1 drachm.
Water	24 ounces.

A wineglassful twice a day for a dose. A fatting beast may continue to receive the medicine until the last few days before slaughter.

Chapter XIII.

DISEASES OF THE FOOT.

There is a homely phrase, "No foot no horse," which has lost nothing of its force by repetition, and all who keep horses and other farm stock should have this old adage in remembrance; we would go further, and say that they should know the foot's structure. The foot of the ox, sheep, and goat may be regarded as a divided one, and in other respects constructed on the same general principles as that of the horse. The solipeds—horses, asses, mules, and zebras—have an outer wall or crust, a sole, bars, and frog. The wall goes all the way round, is highest in front, and lowest behind, where it turns abruptly round and forms what is called the bar or bars, between which is situated the frog. The sole occupies the greater portion of the ground surface, and is carried backwards on either side of the frog. These horn structures have corresponding soft ones to which they are attached. The crust is held to the soft laminæ or fine ridges which dovetail into the fluted inner surface of the insensitive horn. There are hundreds of them.

The sensitive sole is attached to the insensitive one by a number of mushroom-like bodies called papillæ—horn papillæ. The attachment between the sensitive and the insensitive frogs is of the same nature as that of the soles. The bars are the hardest part of the ground surface, being reflections of the crust, and of denser material than the contiguous structures known as sole and frog. Better than any illustration upon paper is the examination of a foot recently removed from an animal. The young horseman will never regret the trouble of getting a foot from the knacker's, or cutting off one from a horse he may have had the misfortune to lose, and subjecting it to maceration for three weeks in a strong solution of soda (two pounds in a bucket of water), at the end of which time he will easily separate the whole hoof from the soft structures and see for himself the manner in which the parts are severally connected. The long pastern bone will be all visible, the short pastern or coronal bone will be found partly above the hoof and partly within it, while the pedal or coffin bone is wholly covered by the laminæ to which they are attached. Winged projections or extensions of the pedal bone on either side exist and are called cartilages. They are important as being the seat of "side bone." A change in their structure from cartilage to bone constitutes sidebone. On the under surface of the pedal bone is a very small shuttle-shaped bone, which from its supposed resemblance to a boat is called the navicular bone. Its importance to the horse-owner is its liability to disease known as navicular lameness. For the stockowner's purpose we may describe the divided hoofs of ruminants as the same, with some little difference of outline, as noticeable on the inner edges, which are straight instead of crescent-shaped as in the solipeds. Some minor differences will be remarked in connection with foot and mouth disease and foot rot, foul, etc. The hoofs of all animals are attached above to a band which secretes the outer layer of hoof and is called the coronet or coronary band. Growth and renewal take place from the laminæ and from the papillæ of the sole and frogs. Like our own nails, hoofs are always growing to enable them to bear the wear they are necessarily subjected to. In the treatment of foot lameness we should be helpless could we not reckon on this growth and replacement of parts which have decayed or have had to be removed for surgical reasons.

SAND CRACK.

This term is applied to almost any fissure or division of the horn fibres of the wall or crust. In a sound foot there is a mixture of gelatinous and hard material which gives the hoof sufficient density to resist injury while retaining enough elasticity to avoid brittleness. Any condition of health, whether constitutional or pertaining to the hoof itself, which causes alteration in the components of the horn, may give rise to sand crack when unusual strain is put upon it. Hence we find it most common in the front feet of light horses with action or used for hunting, and on the inner side or "quarter," as it is called, and at the toe of the hind foot in draught horses, where most strain is felt in starting a load. Chronic indigestion is often an important factor in the causation of sand crack and of seedy toe, to which we shall presently refer. Sand crack may or may not cause lameness, according to its depth and situation. If it extend into the coronet, it will very likely lead to tenderness and lameness at times. If its origin is from the ground surface upwards, and it does not go further in than the outer layer of horn, the horse will most likely not be lame (nor receive attention until it has made such progress as to cause him to be so). Blood sometimes oozes from the crack and matter (pus) if neglected.

Treatment.—When a rift of any kind is discovered in the hoof it should have immediate attention. The general principle to be kept in mind is to remove weight from the defective part and avoid concussion. How is this to be done with a horse at work? By cutting out a crescent-shaped portion of horn from the bottom of the wall, so that the shoe shall have no bearing on that part, and by burning a "V" on the wall, which will direct concussion to either side of the crack. If the coronet is not broken, a mild blister or stimulating application should be applied to induce the horn to grow down faster and stronger. Where there is festering and lameness, it will be well to commence the treatment with a poultice or two, and a dose of physic (*see* Physicking). If the animal is not lame there is no objection to moderate work. There are cases of sand crack requiring special instruments and screws to hold them together, but these call for the services of the veterinary surgeon.

SEEDY TOE.

This is a mal-secretion of horn; a soft seedy or cheesy substance is found between the outer hard layer of hoof and the laminæ from which the inner layer is grown. Because it is more frequent at the toe than elsewhere, it retains the name given above, but it may extend for a long way round the foot and not necessarily affect the toe at all.

Professor Axe discovered a parasite (Pelodera Axei) in some seedy toes he examined, but it is not known if this causes it or merely finds a suitable habitat in decomposed horn of this charater. It is of no consequence, as the treatment long ago adopted with success and recommended here is inimical to the life of such organism.

Seedy toe is not always seen in purchasing a horse, and is one of many good reasons for having the shoes off in examinations prior to purchase. Tapping the foot from the outside with a hammer or the handle of a pocket knife will elicit a sound which to the initiated spells seedy toe. There are generally, in any but trifling cases, some little breaks round the bottom edge of the hoof, the outer layer of horn broken away and quite different from the torn or bent edges one sees in unshod horses or colts brought up from grass. They are often carefully sealed up with wax and resin, or with the dark waxy material found in the sheath of all but entire horses used for service. A foot that is heavily dressed with tar or oily dressings, or specially polished up, should always arouse our suspicions and make us look the more carefully

for sand cracks and seedy toes concealed by such artifices. The stopping most deserving of all is gutta-percha, melted and poured in hot; it nicely fills the interstices and the sound, when struck, is much the same as that of a healthy foot.

Treatment. Have the shoe off and don't spare the knife. The space may as well look enormous and deep, and better than to be full of decomposed material which will prevent any remedy coming in contact with the perverted secreting surface. Every bit of soft stuff being scraped out, the space should be filled up with common oil of tar, and tow employed to keep it in place. If the disease has spread towards the sole, a feather may be necessary to retain the dressings. This may be repeated at the end of the week, and afterwards, instead of oil of tar, melted Stockholm tar will suffice. The coronary band, too, should receive attention by a bi-weekly rubbing with liniment.

Seedy toes will usually quite recover with persistent tar dressings as above, but the horse must never be shod without special attention to the disease, and one should expect to pay the smith something extra, or have it neglected when the owner is not present.

FIG. 59. SEEDY TOE.

CORNS.

These are blood-stained bruises or suppurating places in the angle formed by the turning in of the crust at the bars. They seldom attract attention until lameness occurs; if they do not get it then, they come to light between hair and hoof, as that is the least line of resistance which pus will surely take.

Unless the cause of lameness is obvious, corn should be suspected and the foot thoroughly searched. Everyone suspects a misplaced or splintered nail; only the expert will in some cases seek deep enough for corns. Corns may be so small and deep, in very upright feet, that they want a lot of finding, or they may be so close to the surface in a flat-footed, low-heeled animal, that no one can fail to observe them when the foot is prepared for shoeing. A horse may go sound with a large corn if the shoe is made right for him, or be quite crippled with a comparatively small one.

The lameness to which corn gives rise has in it nothing specially diagnostic or distinctive; the usual symptoms of foot lameness are present.

Treatment.—Pare away the damaged and stained horn until a few drops of blood are obtained. Dress with compound tincture of myrrh. If the shoe is layed off, that is to say, no bearing whatever is felt in the immediate neighbourhood of the injury, the horse may go out of the forge free from lameness in simple cases, and, with care in shoeing in future, quite recover. It has been erroneously stated that corns never go away, but they do. In a more serious case, where matter has formed, it will be necessary to poultice the angle of the foot or even envelop the whole foot in a poultice until the pain is relieved, the inflammation subdued, and a film of new material formed.

If a festered corn is not properly treated it will under run the foot and break out at the top, as above stated, and, worse still, often form a quittor (*see* below).

If the foot is a low weak one, without much horn substance, it will relieve local pressure to employ a bar shoe, but these bend as they wear thin, and need to be thick at first and more frequently replaced than ordinary shoes. If the sufferer from corn has a fairly upright foot and strong heels, he may be shod in a three-quarter shoe, which will leave the affected heel without any bearing at all. It is more likely to grow out with this system than any other.

FALSE QUARTER.

FIG. 60. FALSE QUARTER.

A defective strip of the crust results from injury to the coronary band (*see* page 188), and runs down to the ground surface. Festered corns which have broken up through the top and caused quittor, neglected sand cracks, treads or blows which have killed a portion of the coronet, and frost bite, are among the chief causes.

Treatment is very much the same as for sand crack, but with this difference, a cure can never be effected; all that can be hoped for is to keep the animal workably sound by relieving the defective portion of foot of all weight and pressure. The adjacent sound horn may be grown more vigorously, and thereby afford great support if stimulated from time to time with a weak blister or liniment.

QUITTOR.

This is an abscess in the foot which forms pipes or sinuses, and is a painful and troublesome disease, often proving incurable if not boldly treated at first. It is caused by some injury to the sensitive foot, as treading upon the coronet when pairs of heavy horses are turning in narrow roads; sometimes being done by the horse himself when overloaded and unable to turn. Corns, pricks, festers, any injury which leaves behind a portion of dead material will cause a fistulous wound, such as we call quittor when in the foot, poll evil when occurring at the back of the head, and fistulous withers when found in the latter situation. An abscess at first, with much pain and some matter to be got out, it afterwards remains open as a drain pipe or channel through which to drain away the retained dead tissue. Horses with quittor that have been turned loose in the bush have been known to recover after years, but the process is too slow if successful, and we find the pipe or drain too small as a rule.

The novice seldom recognises the seriousness of quittor until it is pointed out to him by some one who knows. The animal is apparently better; there is less pain than during the formation of the abscess; the horse will walk out without much difficulty, and there is only a little hole or breach between

hair and hoof from which no great amount of matter is discharging. All these things promise a favourable issue to one who has had no experience of quittor, but they are deceptive. The little hole or breach will perhaps heal up. But only to be succeeded by a fresh one just in front of it, and this will go on all round. The horse-owner should leave himself in no doubt as to a quittor, but seek professional assistance, and give the veterinary surgeon a free hand.

Treatment.—Poulticing to get out all matter possible first. The pipes should be explored and cut open by a probe-pointed bistoury, or a knife made for the purpose, which is inserted first and opened when inside. A drain should, if possible, be obtained from the bottom of the foot by cutting away a portion beneath the fistulous wound. In cases which arise from festered corns and nail pricks this advice more particularly applies, and it may be advisable to pass a seton through, from top to bottom, leaving it in and dressing with some corrosive substance.

FIG. 61.
POULTICE BOOT.

The principle to be observed, whatever agent is adopted, is to destroy the pipes and slough out the dead tissues, before a healthy granulating wound can form. There is no more successful treatment than that adopted by the old farriers, who knew not why they did it, save that their fathers had done so before them. It consists in destroying the sinuses or pipes by powerful caustics. A small piece of perchloride of mercury is rolled in a slip of tissue paper, and with the aid of a probe, or by means of a quill, pushed down to the bottom of the wound and, as it is hoped, to the end of the pipe. The presence of this powerful corrosive in such a highly sensitive portion of the animal causes an amount of agony which is painful to witness, but the end justifies the means, since it is usually effectual in sloughing out all that has to be got rid of (and a little besides), and as soon as the slough or "core" is got rid of, the wound begins to granulate from the bottom, and recovery takes place; unless at the time of introducing the caustic the pipe had branches and the amount of material was insufficient to penetrate and destroy them and make a larger opening for the escape of dead tissues. A further plugging has then to be made. Final healing over at the coronet and reduction of the unsightly enlargement are effected by a mild blister outside. Such are the lines to be pursued, but quittor should never be treated by owners if a veterinary surgeon is available.

Vast numbers of horses were treated for quittor in the Army in France, and the following treatment proved the best in the opinion of most of the veterinary officers engaged: For the first few days syringe the pipes (sinuses) with cold water: then inject a solution of twenty grains of perchloride of mercury in one ounce of butyr of antimony. A week of poulticing to follow, and after that injection of a 2½ per cent. carbolic lotion; and finally heal with a dry dressing, such as boracic acid and flour.

As a result of injury to the coronet by caustics in the treatment of quittor false quarter may result.

THRUSH

Is a diseased condition of the frog, and the evidence or chief symptom an offensive discharge of thin matter from the cleft and sides. Standing in ill-drained stables, in contact with urine and dirt, is a contributing cause, but it is often present in animals which have been long in the natural condition of

living in a grass field. Habitual wet, then, must not be accused entirely of producing a disease which every experienced vet. will recognise as constitutional with some horses, and even hereditary in families. Withdrawal of natural frog pressure, by lifting the frog from the ground by a shoe which permits of no bearing on the plantar surface, is doubtless an active cause of thrush. Wasting and decomposition of horn papillæ and a space where the living have let go of the horn correspondents is found, as a result of having no work for the frog, no share in the sustenance of weight. Atrophy occurs here, as in all other living structures thrown out of employ, and thrush is the broken products of horn which have never matured but commonly supposed to have rotted. Some portions are rotted by contact with the fetid products of imperfect function, but the origin is usually in the space between sensitive and insensitive frog. It is important to bear this causation in mind, and not be content to treat developed disease by checking it; choosing rather to prevent it, and apply rational measures, the object and meaning of which are clear to the operator. For many cases of thrush, then, the cure consists in taking off the shoes and replacing them with tips, or sinking tips or three-quarter length shoes. Thrush may be cured at almost any stage, but the earlier the better. The most effectual of all remedies at all stages is calomel, but it is expensive. It is dusted over the decayed surface, after scraping away the dead horn and ragged portions of frog, a necessary preparation for whatever remedy may be selected. There are a host of good remedies for thrush, but some will dry up the frogs too soon, and the legs suffer. It is better, therefore, to give a dose of physic or a diuretic ball or two if the horse cannot be spared from work (*see* Balls), and use an ointment of tar and salt, four parts of the former to one of the latter, applying it upon tow pushed into the cleft of the frog nightly, and retained across a really bad frog with pieces of hoop iron or wood wedged under the shoe across the foot. Chloride of zinc, sulphates of copper and of iron, and other minerals are effectual in drying up thrush, but further shrinkage of the frog follows, falling in of the heels and compression which may lead to chronic lameness, and certainly to permanent contraction of the heels, if attention is not given to the cause and reasonable pressure and use of the parts given in order to restore function.

FOUL OF THE FOOT IN CATTLE. (FOUL, LOO, LOUR, KIBE, OR LOW.)

These terms are used in different districts to indicate a disease of the foot in cattle, or several diseases more or less akin, but having one common symptom of inflammation of the sensitive laminæ and a more or less "foul" discharge. It is also called kibe.* One of the chief causes is an overgrowth of the hoof horn on the inner side, dirt insinuated between the claws giving rise to inflammation and suppuration. It is in many respects similar to quittor in horses, and in some others may be compared to thrush and to foot rot in sheep. The necrosis bacillus is a cause.

Lameness is the attractive symptom, and until this occurs the swollen heel is not like to be seen.

Treatment.—This would be comparatively easy if cattle would consent to regular poulticing, but most refuse to let one put on a poultice at all unless placed under severe restraint. Warmth and moisture aid the suppurative process (*see* Abscess). Failing to poultice, we use so-called digestives. We may cast a bullock or otherwise restrain him once or twice a week for dressings which would not be practicable twice a day. What is next best to poulticing in such a case? Resin ointment, or powdered resin, honey,

* "The times have grown so pict, and the toe of the peasant comes so near to the heel of the courtier, that it galls his kibe."

etc., may be laid on thick, covered with a long bandage and fastened off by bringing it between the claws or digits and tying. It has to be brought to a head, and either break of its own accord when thin enough or be released by the prick of the lancet.

Further treatment consists in keeping the wound healthy by painting with a strong solution of iodine (1 in 16) and drying off with an astringent powder such as burnt alum. Tincture of iodine and spirit of tar, equal parts. is also an excellent remedy for foul. It is applied with a bit of frayed rope.

There is another form of foul or kibe which is tuberculous and usually affects the hind feet. The animal is not acutely lame although very tender; the enlargement comes above the hoof rather than in the heel, and having developed under the skin seems to tear it away from the hoof. Degenerate material is there and tuberculous matter, the coronet is more or less detached, and blood oozes when the victim is made to travel. It is not worth treating as a rule (*see* Tuberculosis).

CANKER OF THE FOOT.

This diseases is commonly a sequel to neglected thrush, but may occur independently. The horn of the sole, frog, and laminal sheath is disorganised, and a very offensive and infectious discharge is produced. While confined to the frog and sole it is deemed curable.

Treatment.—The fungoid growths and decayed horn must be cut and scraped or burned away. The raw surface is then disinfected with salicylic acid, chinosol, or formaldehyde, or any other mixture of astringent and caustic agents. A favourite one is equal parts of copper, iron, and zinc sulphates, with carbolic acid and vaseline to make an ointment or paste, which is spread upon tow and kept upon the parts treated by means of a leather or iron plate under the edges of a shoe nailed on in the usual way. This has to be repeated in a few days, carefully removing every fresh speck of fungus and allowing longer intervals between the dressings as improvement is manifest. There can be no doubt that compelling a horse to work after the first few days is beneficial, as pressure hinders the formation of loose soft horn and favours denser and more suitable growths, but a horse so worked must suffer pain, and the person working it or causing it to be worked will be prosecuted, and, despite professional evidence in favour of the defendant, he may expect to lose the case.

Some practitioners strip off the sole entirely before applying remedies. It is a very painful operation, but usually successful. The pain may be mitigated by general anæsthesia during the operation or by cocaine dressing before and during the performance.

By accident, and while treating horses for another disease, it was discovered that canker may be cured by the continuous administration of arsenic internally.

An ounce of the hydrochloric solution, containing about four grains, may be mixed with the food daily, and gradually increased to three times the amount. Fowler's solution is unnecessarily costly, because it contains tincture of lavender which has no value and was originally added by a beauty specialist to impart an agreeable colour and perfume.

The hydrochloric solution is made by mixing two ounces of hydrochloric acid and one-and-a-half ounces of arsenious acid with four pints of water, heating until dissolved, and then making up to one gallon by adding more water.

PRICKED, STABBED, OR CUT FOOT.

Lameness from the above cause is one of the most frequent. Feet differ very much in the amount of horn or nailing room, horses are fidgety

or vicious, and any sudden movement when driving a nail may cause it to take a wrong direction. The pointing of the nails is not always correct, and they deviate from the line they should take, although the blow is correctly delivered. The chief symptom is lameness. It does not always show itself immediately, but very commonly in a day or two. As much as a week or ten days will sometimes elapse, when the nail has not punctured the sensitive foot but gone close enough to bulge the horn against it and set up slow inflammatory action. Many foot lamenesses are caused by drawn nails—that is to say, the smith feels the nail going wrong and withdraws it, or in worse cases—nearer shaves—the horse flinches and so gives the smith notice to draw back the nail. Many such pricks produce no after-effects unless the nails carry germs and cause festering. Still more are saved by the practice of pouring in some nitric or other acid, or chloride of antimony, which practically ensures death of accompanying germs. Those who practise these proceedings are not aware of the scientific nature of their actions, but it is truly good surgery which has been handed down to them as a tradition.

FIG. 62. DRAWING KNIFE (STAG HANDLES).

Lameness from prick, stab, or cut, like other foot troubles, is most shown on starting out from the stable. The pain may be so trifling that the person in charge deems it a little stiffness, or perhaps fails to see it at all; with exercise it goes off, and the animal appears to be quite sound, until he stops and cools down, when he will be as lame as before, or possibly worse.

A bad enough prick, or sufficiently advanced injury to cause the formation of matter, will be patent to all: the horse will point the foot, if a front one, or hang it—swing it from the ground—if a hind one, and refuse to put the least weight upon it if compelled to move.

Treatment.—In every case of lameness which is not obviously due to some cause above the foot, have the shoe removed and search for pricks and corns. "Have the shoe off if he is lame in the head" is a stable maxim worth keeping in mind, for there is nothing more exasperating than to be rubbing liniments into a shoulder or a hock while matter is burrowing through a foot, to finally show itself at the coronet. Each nail should be traced right through from the sole surface to the crust where it came out. Make sure that you can pass a fine probe or hair pin through without soiling it with matter. If a prick cannot be found in connection with the nail holes, search well the clefts and sides of the frog, and clean the rough portion of the sole, in the search for picked-up nails or flint stone stabs or other injuries. Nails will sometimes pass through the frog or sole, break off, and leave no sign of injury, unless the whole foot is very carefully trimmed and searched. An experienced vet. will be so sure that a certain kind of lameness is in the foot, that he will refuse to believe other evidence on a first search, or if in an indifferent light. When the prick is discovered, the orifice should be boldly enlarged, whether or no the matter has been let out. A too large opening will heal almost as soon as a small one, but the latter may prove insufficient and fail to arrest the upward course the pus will take, ending too often in quittor. In many cases of prick there is found but a tiny drop or two of green sappy-looking matter to account for excessive lameness, but with its evacuation the patient is immediately and greatly relieved. Because he comes out fairly sound he is too often put to work at once, and the wound festers as a result. A prick should always be considered a serious matter

and the animal poulticed and a dose of physic given, unless some special reason exists to the contrary. There is a peculiar sympathy between the mucous membranes of the stomach and intestines and the sensitive laminæ of the foot.

A dose of aloes, in old-fashioned parlance, acts as a derivative; certainly it benefits many forms of foot lameness and should be resorted to in case of pricks.

With prompt treatment pricks seldom lame a horse for long, but if neglected may lead to endless trouble. The injured surface should have some protection from a leather sole or tarred tow wedged under the shoe, as recommended for corns (*see* Corns).

FEVER IN THE FEET, LAMINITIS

Acute or chronic inflammation of the laminæ, or sensitive foot, involving other structures within the hoof and resulting in more or less alteration of the structure and shape of the foot.

Causes.—Badly formed and flat or pointed feet. Fast and long journeys, especially following upon periods of inactivity with good living. Bad shoeing, continuous standing, chills, unsuitable food, and as a consequence of other diseases. Rye, barley, wheat, and, if new, oats and other cereals appear to induce it. Chills produced by standing in the open air after excessive exertion—cooling down too rapidly. Deep draughts of cold water, especially well water. Laminitis follows on colic and other bowel troubles and congestion of the lungs. It is by no means a rare sequel to parturition in the mare and cow.

Symptoms and cause.—It is sudden in its appearance; the animal may have been in health when bedded up for the night, and scarcely able to move next

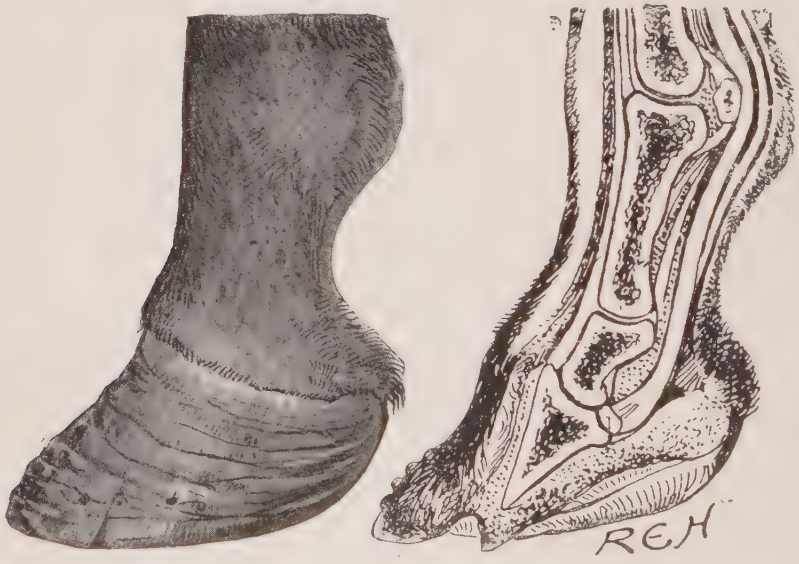


FIG. 63. FOUNDER, OR LAMINITIS.

morning, or in less severe cases showing stiffness on being taken out of the stable, and turning with evident pain. Bad cases are often mistaken by the attendant for some spinal trouble or inflammation of the kidneys, as the animal leans back upon the heels of the front feet, and if the hind ones are also involved, places the latter far forward, and this, of course, raises the spine. Any attempt to move is made, as stablemen say, "in one piece," and with an accompanying groan. The large blood-vessels on the side of the

leg just above the fetlock may be felt to throb, and the animal flinches when the foot is pressed with the blacksmith's pincers. In acute cases it is difficult to get a foot held up long enough for the removal of the shoe. The more acute symptoms abate in a few days as a rule, but with some the pain continues so great that the animal gets down and fails to rise again. A falling in round the coronet is an unmistakable symptom of displacement of the pedal bone, and complete recovery or restoration to the normal foot is no longer possible. The gait is permanently altered, the heels coming to the ground first, and the action unmistakable to anyone who has once seen it.

Cows more often suffer than is generally supposed, but their ability to live on the ground, digesting their food and performing their ordinary functions, misleads any but experienced veterinary surgeons as to what is amiss with them. In bad cases the hoofs of both cattle and horses will come off, and although horses have been slung and kept alive until a very imperfect new hoof has grown again, it is not worth the while of any owner to undertake such treatment. The author has seen cows cast their hooves and do fairly well afterwards, but their different habits and our requirements make it possible to nurse them through without serious loss.

Treatment.—It is important that this should be early undertaken. The modern prejudice against bleeding may be set aside by the amateur, and he will do well to get the shoes off immediately and bleed from the toe vein. It is also a fact that pain is quickly reduced by copious blood-letting from a jugular vein. From two to six quarts may be taken according to the size and condition of the patient (*see* Blood Letting or Venesection). The chief objection to bleeding from the sole is the liability to get septic matter introduced into the wound; this, then, must be guarded against by washing the wound with an antiseptic, and plugging with some tow or other substance soaked in any of the well-known disinfectants. Some bleed from the coronet by several lancet pricks at short distances apart.

The feet should be put in voluminous poultices which will hold the moisture for a long time. A mixture of bran and crushed linseed is perhaps the best that can be suggested, but circumstances may compel the substitution of turnips, bread, or other substances which may be employed to save delay. Cold is more grateful to the patient, but, whether applied hot or cold in the first instance, the temperature of the poultice will be the same in about half an hour, and the benefit consists in the moisture, which has the effect of making the whole hoof expand and relieve the pressure within. A physic ball should be given at once, a good bed offering every inducement to lie down, and the animal should then be left for a few hours. If he lies down, the advantage is obtained of taking the strain off the flexor tendons; the pain is less and sleep is possible. He must not, however, be allowed to remain night and day on the ground because fearing the pain entailed in rising, or he will perhaps never get up again. With the passing of the very acute stage the animal should be shod in a wide-webbed seated out rocker shoe.

It is now pretty generally agreed among veterinary surgeons that exercise should be enforced—a very little only, and at short intervals. Although it may cause considerable pain at first, the circulation is benefited, and the practice is justifiable, as undertaken in the best interests of the patient. Diet should be cool and laxative—cut green meats in summer, and in winter bran, linseed, carrots, &c.

Chronic laminitis is slow in its invasion and progress, and many owners are quite unaware of its existence until a "shoviness" overtakes the horse or the action is changed, or rings form upon the hoof. The foot habitually feels too warm, and the acute form may at any time develop itself.

VARIETIES OF CHRONIC LAMINITIS.

There is a chronic form of inflammation affecting only a limited or very circumscribed portion of the sensitive laminæ and not necessarily giving rise to lameness, until it festers and shows itself at the white line when the sole is cut out. The liberation of a little matter follows, and relief is obtained. Poulticing for this is desirable.

All chronic inflammation of the foot, whether in the ordinary and well-recognised form of fever or not, is relieved by either hot or cold poultices and by wet swabbing. Where the former is not practicable, it is often possible to get the most careless of carters to tie a wet swab round the pastern of a night, and this alone will often make the difference between a workable horse and one that is not. Occasional physic balls, or single drachms of aloes combined with a diuretic, are beneficial (*see* Diuretic Balls).

A mild blister round the coronet and a turn out should complete the treatment.

SIDEBONE.

For the proper understanding of this defect of heavy horses it must be known that the lateral cartilage is a flexible continuation of the pedal bone, and when its cartilage cells become occupied by deposits of bony matter the condition is known as sidebone. It is usually slow and insidious in its appearance, experts having some little difficulty in deciding at first whether

FIG. 64. OSSIFICATION OF LATERAL CARTILAGES OR SIDEBONE. EXTERNAL APPEARANCE. COFFIN OR PEDAL BONE SHOWING EXOSTOSIS.

a lateral cartilage is rather more rigid than usual, or undergoing the ossific change. It is palpable, if not visible, after a variable time and according to the work required of the animal, the hereditary predisposition, &c. That it is hereditary there can be no doubt, and it is a matter of profound regret that some of our most famous families of Shire horses have it in their blood.

The front feet are most frequently affected, the hind ones rarely. Besides heredity, concussion upon hard roads, shoeing and high calkins, and blows upon the foot may account for sidebone. Light horses are not exempt and when affected it is more serious than in the case of heavy draught animals. In any horse, however, sidebone is deemed unsoundness. The draught horse may work without pain or lameness, but the nag will almost certainly fail if made to trot fast on hard roads.

The change in the cartilage may be general, affecting the whole, or confined to portions, and feeling like a small bony tumour.

The development may be arrested at any period of the growth, or go on for years, resulting in an enormous growth or deposit of bone as seen in the illustration (Fig. 64). A small one may excite lameness, and a large one fail to do so. It is often during the formative period that lameness occurs, or when it has attained such proportions as to tie the pastern bones [illegible], or by growth in a particular direction pressing upon soft and sensitive parts.

A small sidebone in a mature horse with a good open well-developed foot may prove no detriment, save in selling value, but a horse with contracted feet, weak heels, or hollowed out sole should not be entertained by a purchaser. One should know the feeling of healthy cartilages and attempt to make them bend under the thumb when entertaining a horse deal to ascertain their condition.

Treatment.—If there is no lameness, no apparent increase in size, and the subject is not a colt at grass, the policy of letting sleeping dogs lie is the one to be recommended. We have known many a sidebone, ringbone, splint, spavin, and other ossific deposits waken into activity by the use of some "specific" which the owner or his man has been beguiled into using to improve the looks of the animal. Usually treatment is demanded for lameness, or for the removal, if possible, of a forming sidebone in a promising colt with life before him. The time-honoured treatment is blistering and firing—the former first, and the latter if it fails. If the blemish is not a serious matter, it may be best to fire first and let the iron be run through the coronet pretty severely, to "open" it, as the old practitioners say. A blister follows the iron, and the greatest amount of absorption is excited thereby. If the coronets have been "opened," pressure is taken off the band, and the best results obtained. Justification for this apparently barbarous method has been shown by the fact that, sawing through the hoof at intervals will often relieve the lameness very quickly. No medicament in the way of blisters is employed, simply giving room to the structures previously pressed upon. The disadvantage of this plan is that the animal so operated upon must be worked, or at any rate actively exercised, immediately, to prevent closure by new material. The practice is extremely painful, and discountenanced generally in this country, although much favoured on the Continent. Sidebone is found to exist in every degree, and mild blisters will act in some cases, and strong ones are advisable for others. It may be taken generally that a good strong biniodide blister is suitable, since the subject is commonly a heavy horse with thick skin, and the substance to be acted upon of considerable density. The strongest blister which can be used with safety is one part of biniodide to six (one *in* seven), and for most horses one to seven (one *in* eight) will be found sufficiently active. Preparations containing corrosive sublimate and turpentine often cause the death of a portion of skin, and the hair never grows again. For further hints on the subject *see* Blistering.

Time at grass or in crewe yard should be allowed for recovery, but it is often observed that those horses which are compelled to go to work almost immediately show a greater diminution of the sidebone as a result of blistering

or firing. The absorbents are either excited by such compulsory labour or a new and greater deposit results. It is the wiser course to give a good turn out or a rest.

RINGBONE.

Sidebone we have shown to be a transmutation of cartilage into bone. Ringbone is a deposit of bone upon bone—an ossific deposit on the pastern bones, and called "ring" because often extending round a considerable portion. It may, however, be only a small deposit, and of any shape, yet a source of acute lameness. Reference to illustration will show two sites, commonly called "high" and "low" ringbone. The suffraginis is the higher and longer of the two pastern bones, and a growth upon it is known as high ringbone, while one affecting the shorter and lower one (corona) is called low ringbone or merely ringbone; the distinction is retained for the higher growth chiefly. It is not always easy to differentiate between low ringbone occurring on the side of the coronal bone and ossification of the lateral cartilage; nor is it so very important from the horse-owner's point of view, for both are causes of unsoundness, and the treatment is much alike—blisters, rest, firing, etc. (*see* Sidebone).

When all other treatment fails, which is by no means rare, there remains the operation of neurotomy, or unnerving (*see* article on Navicular Disease,

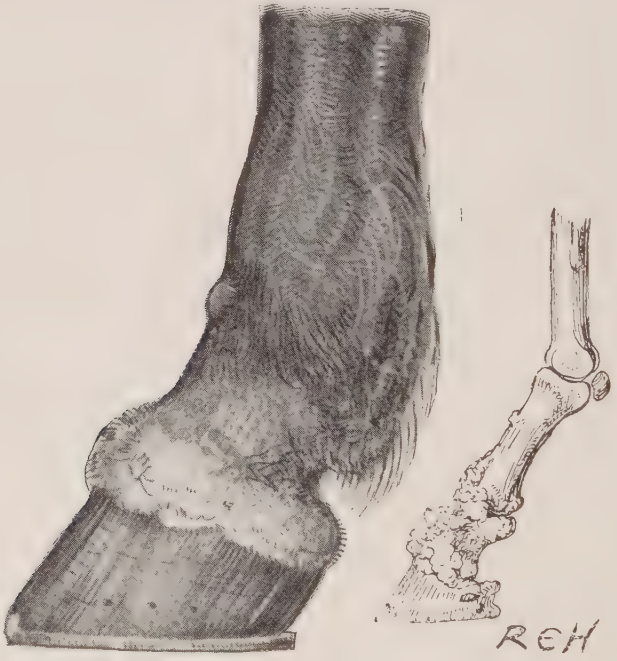


FIG. 65. RINGBONE.
EXTERNAL APPEARANCE. PASTERN BONES SHOWING EXOSTOSIS.

below), and it is surprising how seldom it is resorted to in these cases. It is the experience of most people—certainly it is of the writer—that no class of horses pay so well for unnerving as draught animals with otherwise incurable ossifications below the fetlock joint.

NAVICULAR DISEASE, GROGGINESS, SHOULDER TIED.

The nature of this malady has been known to veterinary surgeons for about a hundred years, and it seems as if it would take another hundred to

get horsemen generally to recognise it, save in the most advanced form, and even then they assign the lameness to the shoulder and call it "shoulder tied." The office and importance of the navicular bone in the mechanism of equine locomotion can scarcely be described in our limited space. Suffice it to say that a characteristic form of lameness arises from several pathological conditions in, or connected with, this bone, and known to veterinary surgeons as navicular lameness.

Causes.—First and foremost there is no doubt as to its being hereditary. Happily it has decreased since so recognised, and mares are rejected for breeding when suffering from it. Within the memory of the writer, any good-looking mare that fell lame with navicular disease was "given a chance," as the owner thought, by blistering or firing the coronet and putting to horse with the promise at least of a long rest. Now one seldom sees such mares bred from. This is the chief but not the only reason for the diminution of navicular lameness. The substitution of wood paving for stone courses in large cities is an important factor in the reduction of cases of this disease. Concussion is in the first instance the cause of congestion in or about the neighbourhood of the joint, and this was always more met with in towns than in the country, if we except hunters. In their case the concussion incurred in jumping is equal to or greater than that produced by high-actioned trotting on hard roads. Acres of essays have been written on navicular lameness, and many minute distinctions made which can only interest the pathologist or veterinarian. The important fact for the horse-owner is the practical incurability of it, and the need of early treatment.

Symptoms.—From the foregoing remarks it will be seen that early recognition is of the utmost importance. One may perhaps be permitted here to point out the necessity of close and constant observation of animals, their habits in health and disease, and to say that many good horsemen—horsemen, that is to say, in the usual acceptation of the term, experts in riding and driving and horse management—are not sufficiently observant to recognise the first symptoms of "navicular," and often insist that it is "only his way" or habit of pointing one foot in the stable, when their attention is called to the first and most important symptom. A horse whose feet are at ease should not place one front foot in advance of the other, unless he does so in order to lower his head the more conveniently to reach fallen food (the habit he has at grass). In the field it is a habit, and a convenient one too, but in the stable, and when not feeding, it indicates some uneasiness or actual pain in the foot. It may be a corn, a nail driven too close, or any other foot trouble save fever in the feet. Pointing should at once be made a matter of careful investigation, no matter from what cause. In a typical case of navicular disease the opposite diagonal, or hind foot of the other side, will be brought forward under the belly, thereby relieving the weight from the distressed member. Either one or both fore feet may be affected. Usually both, but not in equal degree. If one is affected only, the other will, in all probability, suffer later, both from inherent tendency and from the added weight and concussion brought to bear in relieving its fellow. When both feet are diseased, alternate pointing is the plan adopted to get relief, with the advance of the opposite diagonal as before stated. This diagnostic symptom may be preceded or be followed by a slight grogginess on coming out of the stable. Some horses give a long warning of what to expect by the habit alone of pointing, and one may any day see such animals in the stables of the wealthy, and incur the wrath of both owner and groom by the bare suggestion of anything being amiss.

Time, more or less, will show, and presently a little stiffness or hesitation in coming out—"Only a little stiffness, owing to a long run or fast burst,"

the owner will tell you, but the stiffness takes a little longer and a little longer to shake off each time of starting in the morning, and presently amounts to decided stroggumess. All the same the animal will warm up and perform as well as ever, and although the rider has his doubts now as to the soundness of his mount, he is reluctant to believe it is anything serious, or that a long promised run at grass will not put it right. It does appear to do so. If turned out in a wet summer, or soiled in a suitable box, all the worst symptoms pass off, and if sold at this stage an experienced veterinary surgeon may pass him as sound, if he does not insist on a galloping as well as trotting test on the road. Even then he may "hae his doots," but is not able to say that the horse is lame. But let the animal return to work, either on the road or hunting, and it is ten to one he will fail again. Such is the general history of navicular disease in its inception and development: but it may occur quite suddenly after a drop jump on the road, or a fast journey in harness in warm weather. If one foot only is affected, the lameness will of course be more noticeable.

Treatment.—We have said that navicular disease is incurable, and here repeat it, but it should be understood to mean actual alteration of structure as proved by lameness of long standing. The symptoms of "navicular" are common to any concussion in the centre of the foot that does not involve the laminæ, for when the laminæ are inflamed the subject does not point in the stable, but puts as much weight as he can on his heels (*see* Laminitis). With "navicular" he puts as much weight on his toes as he may: hence he goes uphill better than on the level, and downhill is his very worst pace. Downhill is the best pace of the foundered or fever-footed horse. On the first appearance of "navicular" or suspected "navicular" the animal should immediately be taken off work, prepared for physic (*see* Physicking), and a fair aloetic ball given. His feet should be poulticed for a day or two, and wet swabs kept on for a week. If at the end of a week or two it is found that no symptom remains he may be put to work, and should he not fail again we may assume that the concussion was only such as to temporarily affect the navicular region, and that the disease is not established. If with fair work the "shoviness" or pointing returns, the worst may be feared. The physicking, poulticing, and rest will probably have the same effect as before, or nearly as much effect, and a run at grass will complete the so-called cure. This brings us to a rather difficult point, but one that does not strictly belong to the writer's department, namely, the morality of selling such a horse. Most people satisfy their consciences by disposing of the subject at auction, where buyers, according to catalogue, take their purchases "with all faults and errors of description," provided no rule is actually infringed.

If it is decided to retain a navicular subject, or one finds himself "stuck" with one, he may get months and perhaps years of work out of him by habitually swabbing the feet when in the stable, by diuretic doses containing a small quantity of aloes (*see* Diuretics), and when the morning or starting stiffness becomes very noticeable, by putting his feet in a tub of warm water for a few minutes before going out. With or without these helps, the navicular lameness goes off as the animal warms to his work, but he will suffer less if the methods here advocated are adopted.

With many years' experience of navicular, the writer has come to the conclusion that first instead of last the operation of unnerving should be performed—as soon, in fact, as a positive diagnosis is made.

This operation is one which none but a qualified veterinary surgeon should think of attempting, and it will not be necessary for our purpose to describe the method of procedure: suffice it to say that certain trunks of nerve are divided, whereby the feeling in the foot is taken away. The horse is no

longer lame, because he does not feel the pain : the disease generally remains. It used to be supposed that no true curative effect was ever produced, but there is reason to think that in some cases recovery does take place in the previously diseased bone. A sort of porcellaneous deposit fills up the ulcerated spot, and cases have occurred in which union of the divided nerves has taken place, and re-established the current without bringing back the lameness ; they are however rare, and it may be taken as a rule that every unnerved horse is only saved from pain and made useful while he lasts. Some folks think themselves such judges of action that they can tell an unnerved horse, but the writer has put them up on such animals and they have not discovered it in the course of a day's hunting. Veterinary surgeons of repute have been known to pass as sound, horses which have been unnerved long enough to have lost the scars and the little bumpy enlargement which is usually felt at the seat of operation.

Different positions in the limb are chosen for neurectomy, or unnerving, but for the purpose of relieving navicular disease most practitioners choose the plantar nerves just above the fetlock, where these trunks run along the margin of the tendon. The patient is first cast, and then chloroformed, when the operation is practically painless, and with proper attention afterwards the animal should be able to resume work in three weeks.

An unnerved horse needs special attention given to his feet, to see that he has no corns, or injuries from wrongly driven or picked-up nails. He is insensitive to pain, it must be remembered, and will not "say" anything about it if injured. A prick may result in the formation of matter which will run all round the hoof and not be noticed until the hoof is just ready to be cast off ; then the knacker may be sent for without delay. This risk is the chief objection to unnerving, whether for navicular disease, ringbone, sidebone, or other trouble, for which the operation is advised. If the animal is not unnerved until "navicular" has existed for years and the subject become a hopeless cripple unfit to be seen abroad, it will be just as successful so far as making him go sound is concerned, but there may be such strain put on diseased tendons as to make them break away, and the fetlock is seen to go down and the toe to rise. An instantaneous and hopeless breakdown is sometimes seen, but more often the fibres of which the tendon is composed break away a few at a time, and the heel begins to look full, before any sign is seen of the toe turning up or fetlock descending. At this stage horses are often sent into auction sales, and, although their shoulders and cruppers show that much honest work has been done, they appear in the catalogue without any character—a significant omission to those who know how to read such documents. Before leaving the subject of unnerved horses it may be well to correct two erroneous notions which have got abroad among horse-owners. The feet do not decay because unnerved ; the nerves divided are purely sensory ones, and not those which govern nutrition. Proof of this is seen in the early growth of the foot after operation. With restored action, the heels and frog return to their original shape, and in a few months, often, there is very great alteration. A pricked horse is not incurable because unnerved ; it is the overlooking of the injury until too late which causes the hoof to come off. If a prick or festered corn or other injury is discovered and the usual treatment adopted, the same results may be expected in an unnerved horse as in one that has not been so operated upon.

Median neurectomy, or unnerving, is sometimes adopted for lameness above the fetlock (*see* Knee Splints and Other Leg Lamenesses). There is no time limit in respect of the usefulness of unnerved horses. Many die of old age and of diseases, and some do not return six months' service for the operation. Much depends upon the extent of destructive inflammation

which has gone on before operation. Those performed on as recommended in this chapter (as soon as a diagnosis is made) are likely to last for years.*

VILLITIS. CORONITIS. INFLAMMATION OF THE CORONET.

A not uncommon disease affecting the coronary band, but not sufficiently recognised in pre-scientific days to have obtained a popular name, is that above termed villitis.

Symptoms.—When of considerable extent or long standing, there is lameness or a shuffling gait resembling laminitis or fever in the feet, but the animal never goes quite so much on the heels as in that malady, nor is the alteration of structure the same. The early symptoms are standing up of the hairs on the coronet, between hair and hoof, with more or less fulness of the coronary band, and some tenderness on pressure. There is a crustiness of the top of the hoof, and a disposition to crack away or separate from the soft structure above the hoof proper. Any disturbance in the nutrition of this band, necessarily affects the horn below. The intractability of the malady, and the permanent alterations of structure in the hoof, are almost entirely due to neglect to treat it at first. As soon as the animal tries to glide over the ground with feet close to it, in lieu of his ordinary action, he should be thrown out of work.

Treatment.—Remove the shoes, and poultice for three or four days. Meantime have him measured for bar shoes. Apply cold lotions (*see* Evaporating Lotions). A purging ball (*see* Physic) should be given as soon as rested and prepared for it. When the inflammation has subsided, a mild blister (*see* Blisters) should be applied, and if possible a run at grass prescribed. Many such cases recover in a few weeks with rest.

CARBUNCLE OF THE CORONARY BAND.

A portion of the band immediately above the foot may suffer acute inflammation and death, with sloughing of the part from frost-bite or other injury. For our purpose we may class it with "tread" and treat it in the same manner as there directed.

BRITTLE FEET.

The hoofs of all domesticated animals are liable to become brittle from a defective amount of gelatine. It is generally due to malnutrition, arising out of indigestion or unsuitable or insufficient food (*see also* Sand Crack, Seedy Toe, &c.).

HORN TUMOURS.

Horn tumours sometimes grow within the foot of the horse, and between the claws or digits of cattle. They need to be removed with the knife, and the surface cauterised with nitrate of silver or lightly touched over with the hot iron to prevent recurrence. Horn tumours also come upon the skin of domesticated animals, and present a very remarkable appearance. The composition of skin, horn, nail, and teeth is such that when studied under the microscope it needs no effort of imagination to understand how perverted nutrition may give rise to warts or horny material on the skin (*see* Skin Diseases, Chapter XI.).

FOOT ROT IN SHEEP.

It is not necessary here to enter upon any of the arguments for or against the infectivity of this disease. Perhaps the majority of practical observers are agreed that it is infectious, and that certain pastures hold it and cause fresh sheep put upon them to contract the malady. There are, however, plenty of good authorities who deny its contagious nature. A distinction has also been made between an infectious or contagious form and a non-infectious variety. Our own observations lead us to think that both varieties exist. It is very easily conveyed in certain seasons and in particular districts from

* At the time of writing, the author had under observation two horses still going sound and well which had been unnerved for eleven and thirteen years respectively.

one sheep to another and from tainted land to sheep previously free from it, but that in ordinary seasons, and in the majority of cases, it is so slightly infectious that only a few in a flock will get it, although a bad case may be introduced. The symptoms are so well known that we will at once pass on to the more important subject of

Treatment.—This should be early and consistent, when it will be almost certainly successful. In the pages of the *Farmer and Stockbreeder* we seem to be for ever nagging at correspondents for neglecting to do anything until their animals are past recovery. The necessity remains almost as great as ever for repeating the old adage that "a stitch in time saves nine." In nothing does the old saw apply more forcibly than to veterinary matters, and foot rot in sheep is no exception. If a sheep halts at all, he should be turned and examined at once, and preparations made for going through the whole flock. In the end it will prove not a waste of time but a great saving both of time and money.

Fresh cases will present very little difficulty. Scraping away or trimming the decayed horn, and painting with butyr of antimony, is a safe and effectual method, but will probably need repeating in a week. An excellent application is that made of one part of butyr of antimony and two parts of train oil. Almost any of the advertised cures may be used, since they all consist of caustics of the same class in different proportions—sulphate of copper, zinc, chlorine of zinc, and mineral acids. It may be noted here, as in speaking of thrush in horses, too severe and drying a caustic should not be employed in simple cases, as we do not want to shrivel up the foot and compress the sensitive structures within, and mild cases will yield to mild remedies. The nitric acid and corrosive sublimate should be reserved for cases with fungoid growths which must be destroyed before a cure is possible. Even then they should be carefully applied to the parts only which require them, while tarring and cording the rest of the foot with fillis or other soft material. The little man who keeps a score or two of ewes can give the attention necessary to each individual sheep, but the great flockmaster wants a remedy which the sheep will apply for themselves: something he may lay down in a gateway for the flock to pass through, or a trough into which each can be made to step. It is a poor plan at the best, but all sorts of flockmen will find all sorts of methods desirable, and we here give recipes for them.

Fresh slaked lime put down in a gateway, and a hurdle over the narrow opening to prevent jumping, will enable a shepherd to pass his flock through slowly enough for each to receive a rough dressing; or a shallow trough may be similarly placed for a liquid dressing. These means so often fail because the feet are already mudded between the digits as well as on the sides. If it can be arranged to run them through water first, and then on getting out on gravel or ashes to send them through the intended foot-rot dressing, very fair results are obtained. A favourite proportion for a trough is one of two feet wide, one foot deep, and nine feet long. It should be sunk in the ground, and hurdled on both sides as well as at top, to prevent sheep leaping over one another. A solution of arsenic in a caustic alkali has been used with much success. Some sheep dips do very well, but a preference may be given to a mixture of one pound of arsenic, three pounds of common soda, and five gallons of water. The greatest objection to this preparation is the danger of poisoning the pasture upon which they are turned. If yarded in a suitable place, however, this is no insuperable objection. It has to be guarded against with all arsenical dips, with which most flockmasters are quite familiar.

A solution of one pound of common sulphate of copper and one pound of commercial sulphate of zinc in five gallons of water is as effectual and much

safer. As a liquid dressing, the old Scotch remedy of eight parts of oil of turpentine to one of sulphuric acid still finds favour with shepherds, chiefly perhaps on account of its penetrating qualities through mud, and therefore favouring careless application. While it destroys the disease it is apt to cause serious shrinkage, and as a consequence a small amount of lameness after the original trouble has been cured—Scotched, we might say.

Finely powdered sulphate of copper, of iron, and of zinc, made into an ointment with Stockholm tar, has all the advantages of the caustic agent with the preservative and mollifying influence so long observed in connection with tar dressings to all hoofed animals.

Solutions of chromic acid and bichromate of potash in proportions varying from 2 to 10 per cent. are also successfully employed.

The following are well-tried remedies by celebrated prescribers :—

Blue vitriol	1 oz.
White vitriol	1 ,,
Burnt alum	2 ,,
Bole	½ ,,

Honey enough to form a stiff paste.—M'Ewen.

Sulphate of copper	2 oz.
Water	12 ,,
Dilute sulphuric acid	2 drachms.

—White.

Verdigris, bole, and sugar of lead, in equal parts, rubbed together into a fine powder. Sprinkle on the sore, cover with tow, and bind down with tape for twenty-four hours.—Clater.

Red precipitate	1 oz
Nitrous acid	2 ,,
Water	4 ,,

—White.

Aloes	16 oz.
Weak spirit	32 ,,
Sulphuric acid	32 ,,

Mix.—Duville.

A favourite French remedy.

White vinegar	78 parts.
Sulphate of copper	10 ,,

Dissolve and add 12 parts of sulphuric acid. Apply with a feather.

Honey	4 oz.
Burnt alum	2 ,,
Bole	½ lb.

Mix with as much train oil as will convert these ingredients into a salve.

Carbolic acid	1 fl. drachm.
Water	6 oz.

All the foregoing are suitable remedies, but none is successful unless the trouble be taken to pare and clean the feet so that the medicaments come in contact with the affected parts.

FOOT AND MOUTH DISEASE.

Foot and mouth disease is not one of those which the owner will be required to treat, but of which he must give notice to the local authority. It may be well here to note the chief differences between foot-rot and the infectious eczema known as foot-and-mouth disease.

In foot-rot it commences from below and ascends as it progresses. In foot-and-mouth disease it begins at the coronet, often as a red spot exactly between the two digits on the small portion of skin that is free of covering. It then extends around the top of the hoof.

Chapter XIV.

LAMENESS AND BONE DISEASES.

There is no subject upon which the expert more often finds himself at fault, or the amateur more confident of his ability, than the diagnosis of lameness. Why this should be so must be left to the reader to guess. The writer has no explanation to offer; he is often struck with amazement at the confidence with which coachmen and others volunteer to tell him "all about it," while he is fumbling to find out for himself. Professor Williams, while ready to give great credit to some men for what may be termed a natural ability in the detection of lameness, remarks, "To others it is a task of great difficulty, requiring long continued practical study and observation. There are, however, cases where the most experienced are at a loss, and where the most skilful differ in opinion."

It would seem to most men that the lame limb could at any rate be decided upon easily, although the exact seat of the trouble might not be so apparent; yet it is a common experience of the veterinary practitioner to find horsemen treating the wrong leg. Nor is this error confined to one of a pair of front or hind legs; it is nothing unusual for a hind limb lameness to be mistaken for a front one. It is hoped in this chapter to give a few hints on diagnosis, but we would say at the outset that no horse-owner should attempt the treatment of lameness until he is absolutely confident as to its seat. He had far better obtain professional advice, although he may have far to send for assistance.

Before arriving at a decision as to which limb a horse is lame in, the animal should be trotted both from and to the observer and his gait noted. When a horse, only slightly lame in the near fore limb, is trotted away from the diagnoser, he will appear to be lame in the off hind, because one is watching the ascent and descent of the quarter. When the animal is trotted back to the observer it will be seen that the elevation of the quarter is due to the dropping of the head and body, and that the lameness is in front and not behind. Again, horses which are lame in both front feet to an equal degree will "go level," as dealers say, but they are lame to the expert; they go tenderly or "feelingly," or put down their feet with too much care and with impaired action. They also are disposed to bring the hind feet farther under the belly in order to take weight off the front ones. It is so well known to a certain class of "copers" that they purposely make a horse lame on the sound side in order to equalise the tenderness. This practice is known as "beaning," and originated in putting a hard substance, as a bean, under the shoe.

Many slightly lame horses will move fairly well on the straight, but when suddenly turned will show the trouble distinctly. Others will go up hill all right and fumble when coming down (*see* Fever in the Feet, Laminitis, and Navicular).

There are horses with peculiarities of gait which will deceive even experts, and are not really lame, although certified to be so by one man and declared to be sound by another. Let it not be assumed, then, that either examiner is dishonest or a partisan; for nothing is easier than an honest mistake in regard to the subject of lameness. In the case of one hind limb failing, it is not very difficult to decide which; but when both are affected, and only to the extent of being stiff, it is often a nice point to decide whether,

In the case of a heavy draught horse, he shall be deemed lame or only stiff. In either case he is assumed, but a merely stiff Shire horse intended for slow work might prove a valuable animal. In running a horse for examination as to lameness, the man should be instructed to use a long rein, for a short one will cause the animal to turn his head towards the runner, and this gives the appearance of lameness on that side. It is known among stablemen as "bridle lameness."

Then there is "stable lameness," and many good horses have such disqualification, but a clear certificate of soundness. There is every degree of this, and some will limp in the process of walking out of the door and being put into the shafts, while others will have to travel any distance from a few yards to a mile before throwing it off. Enough, then, has been said to show the importance of seeing a horse in the stable as well as outside. Pointing a foot too, or knuckling over at the fetlock with a kind one, may be noticed, or the pastern of a front limb be only rather more upright than its fellow, but to remain such; the upright one is taking only a small portion of the weight.

There are other forms of lameness which are discovered only after exercise, the subjects appearing to be quite well when at rest in the stable or the field. The halting leg may be discoverable on being trotted twenty yards, or be lame, and only slightly after a considerable distance has been travelled.

As a broad rule, but not without exceptions, foot lamenesses are most manifest on first coming out of the stable, and pass off more or less with exercise. Others, due to ossific deposits, such as splints, sidebone, and ringbone, may be just the reverse: allowing of a moderate trot out for inspection, and proving lame when the purchaser puts the animal to work. We have said that a trotting lameness will be the more readily detected on making the animal sharply round; the same applies to the hind limbs: and such maladies as spavin and stringhalt will sometimes be seen in making a horse get over in the stall, better than if run out in a straight line and brought round in a circle.

A large majority of lamenesses are due to, or immediately connected with, the foot, whether in horses or cattle, and it is an excellent rule to have the shoe off in all cases. "Have the shoe off if he is lame in his head," a famous old practitioner used to say to his pupils, and it is not a bad plan. In illustration of this it may be mentioned that a pricked foot and a fractured pastern have been found existing in the same limb, and had not the prick been laid open, the patient could not have recovered from the split pastern. A chronic lameness may exist, like spavin, and the owner, thinking his horse only more stiff than usual at starting, may drive the poor brute with a nail in his foot all the while: one lameness not protecting an animal from another, but adding to the risk by imperfect action.

Lameness, we have to remember, is the language of pain; not a disease, but a symptom of one or more. To distinguish, however, between certain forms of stiffness and halting and genuine lameness is not always easy, and in law courts, accounts for expert witnesses apparently taking opposite sides on questions they should best understand and agree upon.

Immobility, such as may be induced by the joining together of two bones (anchylosis), is technically lameness of the very worst description, but it is doubtful if the pain occasioned in many of the worst *looking* cases is enough to justify a charge of cruelty in working an animal so affected. Lameness may be due to weakness or inability to control the movements. A clot of blood in a large vessel sometimes causes numbness and incompetence, and an illustration of a blood disease producing lameness is to be seen in quarter-ill in cattle.

To decide on the lame limb we may note the animal drops on the other or sound side. He rests as lightly, and for as short a time as possible, on the suffering member, and hastens to throw his weight upon the other; hence the drop. In comparatively slight front leg lamenesses, the animal will also nod his head when progressing; he will only do this with a hind leg lameness that is so bad that one may decide it is not in front by other symptoms.

When we have decided as to the limb affected our next duty is to locate the trouble.

We should first try by watching the movements, and observing the outlines of the limb, before using the hand. If nothing is visible in the way of enlargements, of lumps or bumps, we may discover heat or pain in a particular region when feeling carefully over the limb. There are cases which we can diagnose by the action alone, others where deformity or enlargement points us to the spot, and some in which there is nothing whatever to show; and we have to reason out the case by eliminating all those possible causes which do show signs of some kind or other. As an example we may take that of a horse going lame in front, but without any outward sign or sense of pain or heat on any part of the limb, including the foot. We know that there are many foot lamenesses of a slight character which do not present even the common symptom of pointing when standing at ease in the stable, but there are so few without symptoms to be discovered in any other part of the limb that we may reasonably suspect the foot, and devote ourselves to a more particular examination and removal of the shoe, and although we may fail to immediately discover anything wrong, it will probably come to light with waiting and further observation. A nail driven too close to the laminæ but not actually wounding it, may baulk us for a week or ten days, and then, if the growth of the horn has not removed the pressure, matter may form after all, and the lameness become so acute as to remove all doubt as to the seat of the mischief. It is in such matters that the experienced veterinary surgeon is invaluable. He may not be able to demonstrate the correctness of his diagnosis, but his advice, carried out, will save the horse weeks of suffering, and the owner much loss. The writer has seen many horses rubbed in the shoulder for sprains, when a close-driven nail has been slowly festering in the foot all the time, and would emphasise the importance of obtaining the assistance of the professional man if there is a shadow of doubt as to the seat of lameness.

SPRAIN OR STRAIN.

Over extension is the usual cause of sprain or strain, and may affect muscle, tendon, ligament, or sheaths of tendons. The effects may be seen, or not, according to the situation. Anyone, for instance, will see the swelling, and feel the heat, and prove the tenderness of a sprained back tendon, but a sprain of the inter-osseous ligaments of the hock, or of the psoas muscles under the loin, will only be recognised by the expert.

Muscular strains are more readily induced and more quickly recovered from than those affecting denser structures, as tendons and ligaments. The inflammatory action which follows sprain makes muscle very tender and the lameness acute while it lasts, and the same process in tendon renders the structure soft and unfit for a long time, perhaps permanently, for its proper function.

The results of sprains of muscle are sometimes peculiar, as in rapid wasting of the shoulder muscles. Mere disuse from injury, necessitating rest, has the same effect.

Treatment.—As there are a great variety of strains and different stages through which they have to pass, a single remedy for all cannot be advised.

We may, as a general principle, lay down that the initial stage of sprain should be treated by warm fomentations and poultices, to allay pain and permit of expansion and greater circulation in the involved area. There has been for a generation what is known as a hot and cold school, one set of practitioners advocating hot, and the other cold, applications, and "both are right." When an injury of the kind we call sprain takes place, nature at once sets about repairing it. What we call inflammation, and regard as a misfortune, is really a necessary reparative process. A large volume of blood is sent to the part to repair the breach just as a builder would send material for repairs if part of a house were damaged. The blood-vessels are the roads through which the necessary substances must be carried, and they are temporarily congested by extra traffic. It is nature that repairs an injury, and we must not attach too much importance to our own part in trying to expedite or control the process. That is all we can do. By injudicious meddling we may hinder it. If the reader is a sportsman he will probably have seen the best of surgery effected without man's hand at all, in the birds with half a leg missing, and ground game in like condition. The stump is found to be healed over in the most perfect manner. To return to our hot or cold bandaging, whether applied hot or cold, the bandage or poultice will be, and remain at, *the temperature of the limb*, after the first few minutes (*see* Fever in the Feet).

If this is granted, the effects of hot or cold water will be practically the same. Whichever appears to give the most relief from pain may be adopted. At a later stage, the application of cold in the form of evaporating lotions would seem to be helpful, and finally, stimulating by embrocations or blisters, assists in exciting absorption or the carrying away of superfluous material left by the road-side, if our simile may be pursued.

All the recognised authorities on surgery prescribe rest for sprains. A few men of original ideas, and for the most part dubbed "quacks," have disputed the wisdom of rest, anyhow in certain classes of sprains. They contend that deposits of lymph or other material in excess of the requirements of repair are left, and bind down or otherwise incapacitate the injured member from resuming in full its original functions. Everyone will remember the American quacks, who amid much humbug and band-playing during the extraction of teeth, did nevertheless undertake and succeed in curing cripples whose joints and tendons had been long stiff and abandoned as incurable. There was a Mr. Hutton in this country (since dead) who effected truly marvellous cures, by breaking down these old adhesions by force and insisting on the most painful exercises. There was a veterinary surgeon who obtained a very large practice among human subjects, who followed in the footsteps of Hutton with a success that made him very cordially hated by the unsuccessful medicos he had supplanted. The writer has seen him performing on a number of gratis patients, who testified to the great and lasting success of his unorthodox methods. These, of course, are the very worst of subjects on which such "outsiders" have had to practise, and I should like here to give my own experience in a certain class of sprains, without endorsing either the orthodox or the unorthodox system. Shoeing smiths working for me occasionally sprained their wrists in swinging the sledge, or in other ways. If the unfortunate man belonged to a club and could afford to carry out his doctor's advice to rest it, he was several weeks incapacitated. If (as too often happens) he belonged to no club, he put a tight strap round his wrist and went on working, but in great agony—we have seen men faint from the pain—but the sprain got well in a few days, instead of weeks. The British Pharmacopœia is a permanent testimonial to so-called quacks, and a standing reproof to professional jealousy, inasmuch as it provides formulæ for medicinal compounds which first established their reputation as

popular or extra-Pharmacopœia remedies, and have been officially recognised only when they could not be excluded from a new edition. The Pharmacopœia also shows how new compounds, especially German synthetical substances (with unspeakable names), are introduced with a flourish of trumpets, only to be deleted when the next revision takes place.

SHIVERING, CHOREA, STRINGHALT, ST. VITUS' DANCE, CHINKED BACK, ETC.

Our knowledge of these nervous diseases is lamentably small, and microscopic investigations have revealed practically nothing. The brain and

FIG. 66. STRINGHALT.

spinal cord, together with its coverings (meninges), may appear to be perfectly healthy on post-mortem examination, although the animal while alive was a conspicuous shiverer, had stringhalt, or chorea (known as St. Vitus' dance in the human subject, and sometimes so called in dogs).

Shivering usually comes on in colthood, and most observers agree that it is hereditary. The late Professor Williams speaks of four colts dying of paralysis—the progeny of one dam. We may at least learn from this not to put a mare to horse with any disposition to shiver or twitch. Shivering is, of course, an unsoundness.

The symptoms may not be marked in making the subject of it get over in the stall, or very obvious while going in a straight line, but in turning sharply there will be immobility or an awkwardness, amounting in bad cases to throwing away the hind legs. The supreme test, however, is in backing. The shiverer seems more or less rooted to the ground or sways sideways, and is anxious to comply with any other order than the one given. If put into a cart and made to go down hill, he will be unable to keep back the load.

Treatment.—This is purely empirical. It is thought by some that a sharp blister along the spine causes a diversion, and benefits in the cases of colts at grass and when first attacked. Others have ascribed improvement to the giving of repeated doses of bromide of potassium or ammonium (*see* Table of Doses).

CHOREA.

Any other form of twitching than what is known as shivering in horses is so rare that we may pass it over, but in dogs it is a very frequent and serious sequel to distemper (*see* Distemper).

STRINGHALT.

A peculiar snatching up of a hind limb—one or both—more particularly noticeable in crossing from one side of the stall to the other, and varying in degree and intensity from an almost trifling defect to a prohibitive unsoundness. Horses may be slightly affected for years without interfering with their usefulness, and the malady may be only seen when first coming out of the stable. It is also more or less intermittent in its appearance and disappearance, but sooner or later it develops into a serious defect, and a horse affected with it should be deemed unsound. We are much in the dark as to its pathology and treatment. Australian observers thought at one time it was due to worms, but this view has not been confirmed by subsequent investigation. A run at grass often causes an abatement, but the trouble returns when put to work in almost every case.

CHINKED BACK.

This term is indifferently applied to a number of diseases affecting a horse's mobility in the hind limbs. It may be spinal injury insufficient to cause paralysis, or only noticeable in certain movements or under special circumstances, as in backing or keeping back a load when going down hill. He may even perform the labour required of him in a satisfactory manner, but be unable to rise unaided when he lies down. Such animals seldom or never thrive, and are apt to get cast in the stable. Indeed, it is probable that not a few have received permanent injuries to the back in the first instance by getting fixed in the stall, and that such accidents are the cause rather than the result of being cast. It will be noticed, too, that some horses, supposed to be chinked-backed, and afraid or unable to get up and down in the stable, will experience very little difficulty in doing so when turned out in a field. The practice of some carters of making horses turn in a narrow stall may contribute to the number of cases. They should be backed out where the accommodation is not ample for turning.

It is not a sufficient insurance against getting a horse cast to tie him up to the rack at night. If he is known to be chinked-backed he should be put in slings.

RHEUMATISM, RHEUMATIC LAMENESS.

Rheumatism, whether in the domesticated animals or in men, prefers to attack serous and synovial structures; hence we find the neighbourhood of joints chiefly involved.

Symptoms.—The one characteristic symptom is the sudden shifting of the trouble from one place to another, as often as not from one limb to another. This peculiarity gives rise to some curious misunderstandings between clients and veterinary surgeons. When the vet. has prescribed for a lameness in one leg the owner finds that the animal is lame in another, and perhaps going sound on the limb previously affected. The owner thinks his professional adviser incompetent, and calls in another practitioner, who finds the lameness

in yet another place. Swelling and tenderness may or may not assist in locating the malady. Horses, pigs, and dogs are more liable to rheumatism than other animals. The enlarged and painful joints of cattle, commonly assigned to rheumatism, are generally of tuberculous origin (*see* Tuberculosis).

Although a horse may be affected in any part of his anatomy, rheumatism nearly always occurs in or near a joint, and is within reach of medication. The nature or pathology of this complaint is little understood. While it is generally agreed that damp and ill-drained stables, styes, and kennels more often contain victims, those which are housed under model conditions do not always escape. Want of elimination of waste products of the body plays a large part in its causation, and in the case of pigs and dogs it frequently resembles rheumatic gout, in the enlarged and painful joints affecting individuals over-fed and unable to obtain sufficient exercise.

Rheumatism often attacks thriving pigs, and in the experience of the writer, Tamworths are more prone to it than other breeds. There is a high temperature, more or less constipation, high-coloured urine, great pain, and lameness when compelled to move. There is reason to suppose that true rheumatism in pigs is often confounded with a joint trouble due to the invasion of a micro-organism similar to that affecting young animals of other species, and now known to enter through the navel string. (*See* Joint Ill, *also* Scours).

All classes of dogs are liable to so-called kennel lameness, and if we say that hounds kept in damp places, with inadequate straw or warm bedding, suffer acutely at times and in considerable numbers, we have also to remember that my lady's pet is no less a sufferer, especially as he advances in years. There are much the same varieties and degrees of rheumatism in dogs as in their masters. A stiffness in certain movements may be all the symptoms displayed until the animal is lifted by his front legs, when he will call out with the pain, the chief seat of the trouble being in those muscles which attach the forearms to the trunk. When more generally affected his gait is short, and he moves all in one piece, his countenance wears a haggard look, and he is disposed to creep back to his corner, where he feels safe from interruption. A more acute and general attack resembles what is known as rheumatic fever in man, and the subject of it is a pitiable object indeed.

Treatment.—When localised in the limbs of horses, a smart blister has been found beneficial in drawing out, as it is supposed, the rheumatic poison. Whether this is the true explanation or not, the effect is usually obtained. In less severe cases, an ammoniacal liniment, as white oils, or soap liniment may be used. A stronger one, consisting of aconite, belladonna, and compound camphor liniment, is found to answer well, when the pain is severe and confined to a small area.

The administration of a moderate dose of aloes in the form of a ball (*see* Physicking) is in most cases a safe and desirable practice, but one would not adopt it if a horse were at grass, or in strawyard. It is remarkable that so few horses suffer from rheumatism when at grass and exposed to the inclemency of the weather, and this observed fact tells in favour of the theory that rheumatism comes from within, as previously hinted at, and that a predisposition to it is merely aggravated by certain conditions or environment. After a dose of physic, salicylate of soda or salicine may be given twice or three times daily (*see* Table of Doses).

Pigs may have the same liniments as horses (*see* above), and should be removed to a high and dry situation and given plenty of warm, dry bedding. A dose of Epsom salts and ginger may be followed by salicylates as recommended for horses above (*see* Table of Doses).

Dogs.—A brisk aperient of jalap, or castor oil and syrup of buckthorn, should be given, to ensure the bowels being open. We may then choose between salicylates, as recommended above for horses and pigs, or give bicarbonate of soda and colchicum wine. Both are excellent remedies, but colchicum may be given the preference in the case of old dogs of gouty temperament. The liniment of aconite, soap, and belladonna will be advisable, and plenty of time should be given in rubbing it in with a piece of flannel previously warmed before a fire. The diet should be farinaceous only, and milk may be given as a drink. Dogs usually recover quickly from acute rheumatism if treated as here advised, but some old animals habitually suffer from it. To make their old age comfortable, they should be occasionally dosed with an aperient, and the colchicum mixture administered for a few days, reverting to it from time to time when more troubled than usual.

LAMENESS CONNECTED WITH THE SHOULDER AND UPPER PORTIONS OF THE FORE LIMB.

It has elsewhere been explained that shoulder lameness is rare, and what is commonly believed to be such is in the great majority of cases at the other end of the limb (*see* Navicular Disease).

There are, of course, genuine shoulder lamenesses. The most common are due to accidental injuries, and of these collision against gate posts is the most frequent of all. A careless groom, in leading a horse into or out of the stable, with a winker bridle on, so that the animal cannot take his own measurements, is ofttimes responsible for a blow, which may leave no mark or well-defined area of tenderness, yet cause such bruising of deep seated structures as to induce lameness; about which he naturally says nothing, since it would bring discredit upon himself. Rheumatism is another cause. Over-extension and sprain of some of the important muscles, especially when turning suddenly. Altered action through chronic foot lameness.

Symptoms.—Where the lameness is very marked, the diagnosis is not difficult, and the difference between foot and shoulder lameness may be easily defined. In the majority of foot troubles, and especially those which are commonly mistaken for shoulder lameness, the foot is extended (*see* Navicular Disease, and Fever in the Feet). The animal points when at rest, and goes uphill better than down. In shoulder lameness the difficulty is in bringing the foot forward. The animal, if only a little lame, gives his leg an outward or circular motion, and if very lame drags the toe. Every horseman should keep these points in mind, as they are diagnostic. If the shoulder is carefully manipulated some tenderness or shrinking will be noticed—if not, when standing on the suffering member, then when it is held up and moved outwards as well as forwards and backwards. With the forward movement the animal will perhaps give a groan, or use in the air, to escape the tension upon the painful parts. No such behaviour will be seen if the trouble is at or below the knee.

Treatment.—Warm fomentations, stimulating liniments, blisters, time, and voluntary exercise obtained at grass, or in straw yard (*see* the treatment of Sprains or Strains).

SHOULDER SLIP.

The shoulder joint is the only one in which strong side ligaments are not present to prevent dislocation. The size of the surface of the armbone (humerus) where it articulates with that of the blade bone (scapula) is much in excess of the latter, and gives a very large amount of movement in all directions, as compared with other joints. It is clothed as well as kept in place by muscles only, but one of these is very tendinous and tough and plays

like a stout rope over a pulley, allusion to which will be made in another place. The arrangement above cited makes it comparatively easy for shoulder slip to take place when a young and soft animal is at plough, with one foot on the ridge and the other in the furrow. The continued strain on one side causes the muscles to tire and yield ; hence the partial dislocation, or shoulder slip. It is *only* partial, it has to be remembered, although a serious condition demanding immediate attention. The inflammation produced and the loss of use also combine to induce atrophy, or rapid wasting of the muscles of the blade—those more particularly which fill up the ditches on each side of the ridge or spine which unequally divides the blade bone.

Symptoms.—If positive lameness existed at the very first, this serious trouble would be more often taken in hand in time, but it need not cause lameness until the wasting process has begun. There is more or less swelling and tenderness over the course of the muscles, but this often passes unobserved, unless the youngster proves restless in putting the collar on : even then, the cause may not be observed.

Treatment.—The same as for shoulder strain (*see* previous page).

Horses so affected almost invariably recover, and many buyers do not object to wasted shoulders, if the price is right, and will allow of extra time in preparation for sale, during which they are curing themselves in moderate work. Another form of shoulder lameness, so called, is from disease of the liver, and this invariably happens on the right side. It is distinguished from those previously referred to by absence of the signs mentioned (save the fact of being lame) and by yellowness of the white of the eye (mucous membrane or conjunctiva).

Treatment.—This must be aimed at the liver (*see* diseases of that organ).

Abscesses in the glands under the shoulder may cause lameness. They occur in this situation from the infection of strangles or from stakes or injuries (*see* Abscess, Staked Wounds, &c.)

ELBOW LAMENESS.

This is seldom a seat of lameness, and the unsightly enlargement known as capped elbow is scarcely capable of causing it, even in the worst of cases (*see* Capped Elbow). Fracture of the point and of that portion of the bone where the union commences with the radius is rare. Sprain of the ligament on the inside (internal lateral) is caused by the animal slipping when rising from the ground and failing to grip it with the foot. It requires the same treatment as other over-extensions (*see* Sprains and Strains).

DROPPED ELBOW.

This condition is not an injury to the elbow at all, but fracture of the first rib ; its true cause being discovered by Mr. Willis, a veterinary surgeon then in the employ of the London General Omnibus Company.

Treatment consists in slinging, and a long rest, and turn out.

KNEE LAMENESSES.

Sprain of the radial ligament is shown by a swelling and tenderness above and behind that joint or in a difficulty only in flexing the knee.

Treatment.—A cooling dose of physic (*see* Physicking). Warm fomentations and bandages and a blister. It is important to give a long rest afterwards, to enable the products of inflammation to be carried away. The tendons are otherwise compressed, and there is friction where, in the healthy leg, there should be a tendinous rope running through an oil bath.

Knee Spavin (*see* Bony Growths and Ossifications).

INFLAMMATION OF THE KNEE.

The great number of bones and ligaments of which the knee is made up would lead the amateur in veterinary surgery to expect trouble in so complicated a joint. The very reverse is the case. It is but rarely the seat of lameness, and its comparative immunity is due to its multiplicity of parts. Concussion is spread over a number of small bones, each with a cushion arrangement designed to prevent it. Carpitis, or inflammation of the knee, is occasionally met with, and may be acute or chronic. Stiffness and tenderness, difficulty in bending it, or loss of action in less severe cases, characterise this trouble, but it is not likely to be encountered except as the result of direct injury or in connection with other troubles, which of themselves would help the examiner to diagnose it. The knee shares with the shoulder the suspicion of many forms of lameness which are all the while in the foot. If the reader will observe any stale old subject of navicular disease, he will see that, as the animal passes him at a trot, neither the knee nor the shoulder is used to its full extent. The suffering animal takes short steps, in order to bring down his foot on the toe, where he feels pain least. This makes his action stilty all the way up the limb, and the knee, which appears to be so stiff, will be found to have full liberty of movement, if the limb is taken up in one's hand and manipulated.

The same test may be applied to the shoulder (*see* Rheumatism and Shoulder Lamenesses), but the restricted movements and undue concussion which follow upon long-continued foot lameness contribute to bring about structural change in the great pulley (tendon of the flexor brachii) which passes over the groove on the top of the arm bone (humerus). It becomes ossified, or partially converted into bone (*see* Sidebone and Ossifications). If from a fall or other known cause the knee is inflamed without abrasion of the skin, a blister will in most cases be suitable, special care being taken to avoid injury while the animal is in pain (*see* Blisters and Blistering).

CAPPED KNEE. HOUSEMAID'S KNEE OF COWS.

A soft swelling in front of the knee is met with in horses as the result of bruises and falls, and is of the same nature as capped elbow and capped hock (which *see*). It may often be cured by gentle continuous compression with a thick fold of lint, a layer of cotton wool, and a bandage over all. Cold lotions (*see* Lotions) should be constantly applied. A bandage can only be retained on the knee by building a foundation (of any material that may be handy) between the lower edge of the joint and the fetlock.

The enlarged knees of cows, often erroneously termed housemaid's knee, because incurred in the same way (kneeling on the ground), is also a bursal enlargement. We may not lay open the horse's knee without serious detriment to his sale price, but in the case of a cow we may promptly lance the swelling or rather cut it open with a long clean sweep, keeping the edge of the knife outward, so as to avoid the possibility of cutting more than we wish and doing an injury to the joint. When the straw-coloured fluid has been liberated, the cavity is to be syringed daily with tincture of iodine to prevent too rapid union and refilling. The subsequent blemish is a much less serious objection than the increasing lump on the knee, which seriously incommodes the animal, and often becomes painful. (*See* Methylated Tincture of Iodine.)

BRUSHING, CUTTING, OVER-REACHING.

In many cases, brushing one limb against the other, or the shoe of one foot against the fetlock of its opposite neighbour, is caused by weakness or

the awkwardness of colthood. In some others it is due to conformation, and not so easily remedied. When colts are broken at two years old, as is the custom in most districts, they are very quickly tired, besides being unaccustomed to turning in shafts, and brushing is provided against by the careful breaker by "boots" or folds of rug. Whether the animal merely bruises or rubs the hair off a place, or, with the edge of the shoe, actually cuts the skin, it should be taken seriously, and promptly attended to. Each time a blow is struck the part is inflamed, and, unless successfully treated, thickening takes place, and it is increasingly difficult to avoid brushing. It may be necessary to pause in the education of a colt, to prevent permanent blemishing and chronic brushing; but few persons have the patience to do so, or regard the trouble as of any consequence.

If weakness or clumsiness is the cause, a cold bandage applied with gentle pressure may be sufficient to remove the soreness and prevent swelling. If

FIG. 67. SCARS CAUSED BY BRUSHING.

the skin is broken, it will be better to apply a pad of carbolised lint or wool, and bandage over all.

If the defect is due to turned-out toes or limbs "put on wrong," a consultation with the practical farrier, and a reward for extra trouble in fitting the shoes, may prove advisable.

Some amount of crust can be spared, and what is called a feather-edged shoe will often just clear the danger point, where an ordinary one would ruin the wearer. A clip at the side is sometimes the cause, and one at the toe or extra nails on the outside quarter will give the required hold upon the hoof, and permit of some liberty being taken in the rasping away of the offending portion. When everything has been done by a good smith, there will still be horses so constructed that they will continue to brush, and these must be provided with some mechanical contrivance to minimise the concussion, or teach the habit of going wider. The simple remedy of a Yorkshire boot

(folded piece of rug) constantly worn enables many a horse to work without injury, and its appearance is its chief objection. Leather ones and rubber caps fitted with straps may look better, but are apt to become hard, and

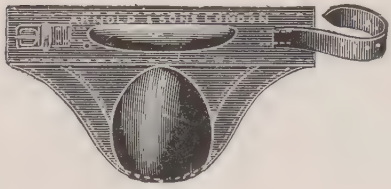


FIG. 68. FETLOCK BOOTS.

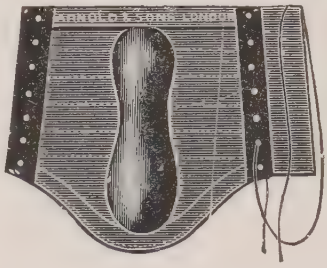


FIG. 69.

bruises occur despite them. A large rubber ring pulled over the foot and worn near the brushing place is perhaps more likely to cure the habit than anything else. It moves forward when brushed against and does not wring

FIG. 70. RACE LEGGING.

FIG. 71. RING BOOT.

or bruise the skin, and, if the horse is not too old to learn, teaches him to make allowance for its presence and so "go wider."

It is not always easy to see just what part of the foot strikes the opposite limb, and to determine this a greasy stain should be put on the supposed

FIG. 72. OVER-REACH BOOT.

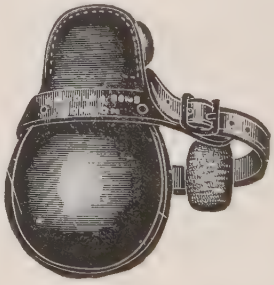


FIG. 73. FETLOCK BOOT.

part, and the horse trotted a few paces and turned rather abruptly, when a mark will be found, and assist in determining the nature of the defective action. This test may also be applied to over-reaching. The heel of a front

limb may be wounded by the shoe of a hind one, a front shoe may be torn off in the same way, or the sound known as "clacking" may be caused by striking the ground surface or the heel of the front shoe. Many cases of over-

FIG. 74. SPEEDY CUTTING PAD.

reaching are cured by simply substituting a cow-mouthed shoe for one with a toe clip.

Youngsters should be kept together, driven "collectedly" as is said, and not allowed to go all abroad and contract careless habits of any kind.

SPEEDY CUT.

FIG. 75. SPEEDY CUT.

This name is given to an injury on the inner aspect of the knee, caused by striking it with the opposite foot. Beginners should be quite clear that it is not the same thing as brushing. The former is an exceedingly dangerous defect, and should be deemed unsoundness, while brushing is usually remediable. Speedy cutting only occurs in trotting, in horses with high action, but any horse may injure himself in like manner when galloping. The prominence on the lower half on the inside portion of the knee is the common seat of speedy cut, but there are animals with extravagant action which sometimes strike the end of the radius, which is the long bone extending from the elbow to the knee joint. The habit is dangerous enough to harness horses, bringing them on their knees, but in a saddle horse it is an unpardonable fault, because so dangerous to the rider. It is important to be able to detect the old scars or enlargements resulting from previous injury, when buying a horse, and the purchaser should feel carefully all over these parts.

Treatment.—Everything should be done to prevent permanent enlargement and callosities forming, and with this object we should foment very freely with an antiseptic (*see* Antiseptics), and—in the everyday language of the stable—draw out the inflammation, if necessary, by poulticing; for if we get a soft swelling and slight discharge at the time, there will be less likelihood of a deposit of hard material afterwards. Gentle and increasing pressure from bandages should be applied until the parts have assumed their normal aspect. Walking exercise should be freely given, but no movements that might endanger another blow on the bad spot. (*See* Wounds.)

BROKEN KNEES.

Any breach of the skin in front of the knee, at a line drawn through the middle, is called broken knee, and while the injury may be but trifling, and, when healed, no more than a few hairs may be missing or persistently awry, the value of a horse is seriously diminished by the blemish, be it ever so slight. Since any horse may chip his knee without defective action, it is scarcely fair to regard a slight blemish as unsoundness, and it is not so regarded by most veterinary surgeons. No vet. would, however, pass a broken knee without "mentioning" it in his certificate, and this is equivalent to branding the animal as faulty. Dealers agree that there is no horse so difficult to sell as a broken-kneed one. Everybody can see it, and the most ingenious stories fail to explain it away. There it is, and the animal is worth many pounds less, although he may never fall again. Yet it is not an unfounded prejudice that buyers have to a blemished knee, as it too often arises from defects of conformation, as speedy cutting, turned-out toes, brushing, a low "daisy-cutting" or slovenly way of going. Horses with a heavy forehand and sluggish temperament are apt to go down when tired, despite every effort to keep them awake on the part of the driver. For these and many other reasons a blemished knee is looked upon with suspicion.

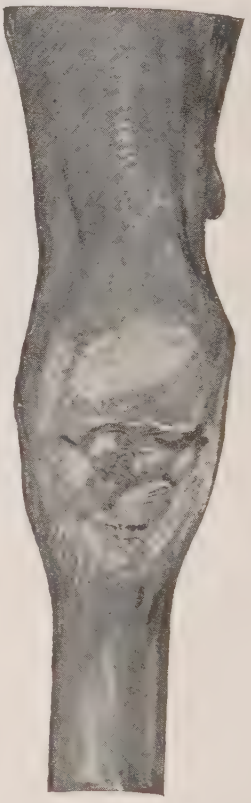


FIG. 76. BROKEN KNEE.

Treatment.—As the horseman is never prepared for this accident, and it generally happens away from home, he will in ninety-nine cases out of a hundred do the wrong thing, by sponging the wound with the first rag or stable sponge available. Better far to do nothing until the animal can be got into a stable, since the wound will be impregnated with deleterious organisms. No time should be lost in applying some carbolised oil or other antiseptic dressing, and in the case of a simple skin wound nothing more may be needed. But broken knees are sometimes filled with road grit, or the tendons are cut and bruised, and the bursa broken and losing synovia. This is often thought to be an escape from the true knee joint of that "oil," which may prove fatal to the animal. There may also be bruising of one or more of the small bones, and fracture is not unknown though rare. If joint oil is really escaping, no time should be lost in seeking professional advice: meantime a poultice should be applied with an antiseptic (*see* Antiseptics and Disinfectants). No ragged skin or broken tissues should be cut away, rather should they be left until it is evident that Nature is trying to cast them off by the process of sloughing (*see* Treatment of Wounds). There will be too little skin eventually, but in its place a scar, both shining and hairless.

The limb should be bandaged from the foot upwards to prevent swelling and save the skin from being scalded by discharges. A dose of physic is also good treatment (*see* Physicking). Fomentations and poulticing will draw out grit, or the wound may be syringed with a 4 per cent. solution of creolin. It is safer to wait for the extrusion of foreign matters than to employ a probe, provided the water and poultices are rendered aseptic.

In a few days granulations will appear and rapidly fill up the space. The experienced surgeon will encourage or discourage them, according as they come in a healthy manner or not. If soft and irregular, and disposed to grow beyond the level of the skin, he will repress them with caustics, as the nitrate of silver, blue stone, sublimate, or chloride of zinc. If they are pale and weak-looking, and make but slow progress, further poulticing may be needed, with the addition of some powdered resin or basilicon ointment.

It is at this stage in the treatment of a broken knee that the amateur commonly goes wrong. He will poultice, and get a nice healthy growth, but fear to use a caustic, and so allow a lump to grow and a great disfigurement, where there need only have been a hairless but level patch. If the owner fears—and there is not the slightest ground for fear—to use a caustic in repressing granulations, then he had better let it altogether alone, as the hard scab which nature forms will prevent a very excessive bunch or lump being left. Our object, of course, is to make the blemish as small as possible, when the horse shall finally have recovered, and the way to do it is to run over the red surface granulations every day or two, according to their growth, with a nitrate of silver stick, and allow the scab to dry on. At the next visit the scab is to be roughly rubbed off, leaving a soft bleeding surface. To this the pencil is again applied, and each time it will be found that the scab is smaller than before, and the edges of the skin approximating nearer and nearer.

The end of that case will astonish the man who carries out the treatment, as the blemish will be less than he could have imagined. It is accounted for by the elasticity of the skin. All round the neighbourhood of the wound the good skin has been stretched to contribute to the closing up of the breach. This does not take place to anything like the same extent if the plan is not adopted of rubbing away the scab and cauterising, as before advised. Many practical veterinary surgeons used formerly to condemn exercise while a knee was healing, as they had seen lockjaw (tetanus) follow. We have the explanation now in the greater liability to the introduction of the specific germ of tetanus on an opened and exposed surface, while the animal is moving; but, knowing as we do that tetanus can come no other way (*see* Tetanus), we can provide against it by antiseptic dressings, and take advantage of exercise in improving the circulation, promoting healing, and preventing that loss of mobility in the joint which renders broken-kneed horses liable to fall again.

When a knee breaks out at the back there is some dead substance retained, and Nature is establishing a fistulous opening to get rid of it. Such cases should be undertaken only by the qualified veterinary surgeon, and even he may find them beyond cure, and advise the patient's destruction.

Where the knee is so injured as to allow of the escape of joint oil, special treatment is required (for which *see* Open Joint).

CONTRACTED TENDONS.

Shortening or contraction of the back tendons of the hind legs makes the subject of it go on his toes. Only one leg may be affected, but its fellow is extremely likely to follow the same way. It is quite useless to thicken the toe and lower the heel of the shoe with the idea of stretching the tendon. The practice only causes pain, adds inflammation, and farther shortens the tendons it is meant to elongate. There is no shoe that will cure it; we must accept the shortening and provide a shoe to meet the difficulty by having long heels, calkins, or a patten; so that the space is bridged,

and a purchase obtained by the heel as well as toe. No "oils" or other treatment will have the least effect. There is an operation called tenotomy or tendiotomy, whereby the tendons are divided; the pastern at once sinking almost to the ground, as in a case of "break down." Reunion occupies such a very long time, and the subjects of this disease are so seldom worth the cost that only in exceptional instances is it to be recommended. Rather, we should say, keep the animal at work with a high patten shoe, so long as he is not in pain.

SPRAIN OF THE SUSPENSORY LIGAMENT.

Sprain of this very important ligament necessitates a long rest, after the usual treatment for sprains. It is frequently found best to line fire pretty closely, as soon as the inflammation has subsided.

See also Treatment of Sprains or Strains.

SPRAIN OF THE TENDO-SUBCARPAL LIGAMENT.

This ligament occupies a position between the back tendons and the bone, and is often mistaken for the suspensory ligament referred to above. (*See* Treatment of Sprains or Strains.)

SPRAIN OF THE FETLOCK JOINT.

This generally means over-extension of one or both lateral ligaments of the joint, with a diffuse inflammation causing swelling, heat, tenderness, and lameness.

Treatment should be such as is laid down for Sprains and Strains.

INFLAMMATION OF THE SESSAMOID BONES.

This trouble is seldom diagnosed by horse-owners, or else is mistaken for sprained fetlock or tendons. There are two small floating bones at the sides and rear of the fetlock. They are called sessamoids. They may be the subject of chronic inflammation, or the cartilage over which the flexor perforans tendon plays. Gradual enlargement and impairment of action ends in absolute lameness. The bursa is inflamed and bulges, the tendons and bone become adherent. If the suspensory ligament is the chief seat of the trouble, the fetlock may descend, and the animal will go on his heel, but usually in sessamoid lamenesses he will go on his toe. Although it will require a professional man to distinguish which of the soft structures are involved, the observant horseman will easily distinguish between an enlarged and inflamed bursa and a big tendon or sessamoid bone.

Treatment.—If the lameness is due to bursal inflammation with a sympathetic extension to the adjacent structures, it may be treated with cold affusions or evaporating lotions (*see* Evaporating Lotions) and a dose of Physic (*see* Physicking), together with a week or two of rest.

The more serious condition, previously alluded to, must be treated drastically, either with repeated strong blisters or the firing iron (*see* Blistering and Firing), after which a prolonged run at grass should be given.

HIP JOINT LAMENESS.

Many obscure lamenesses are attributed to the hip joint, but it is not a very frequent seat of trouble. When a sprain does occur, it is at the head of the great thigh bone (femur), which articulates with the cup. Blows from without may cause inflammation, and a deposit of bone similar to ringbones (*see* Ringbone and Sidebone). Some degree of swelling and tenderness may help us to locate the trouble, but the treatment is very much the same whether we are able to make a diagnosis or not—rest, fomentations, blisters, and a run at grass (*see* Sprains and Strains).

STIFLE JOINT LAMENESS, ROUND-BONE OR WHIRL-BONE LAMENESS.

Lame in the "round bone" is a favourite suggestion of grooms and others who, when asked to put their finger on the spot, as often indicate the upper and foremost portion of the ilium (antero-superior spinous process of the ilium) as upon the stifle. The stifle corresponds to the knee joint of the human subject. Inflammation of this joint leads to ulceration of the articular cartilage.

The leading symptom of stifle lameness is dragging of the toe and a semi-circular movement of the limb when progressing.

Treatment.—Blisters or blister charges have long had a reputation for stifle lameness, and they are supposed to act in two or more ways. The immediate effect is to ensure a swelling around the parts which acts as a cushion and a support. The inflammation in deep structures is drawn out to the surface, and the movements are circumscribed, and thus favour rest. Whether this is so or not, we have found nothing better.

LUXATION OF THE STIFLE JOINT OR STIFLE SLIP.

This accident may occur to any animal at no matter what age, but it is among growing colts that we most expect to find it. The patella, or round bone, which corresponds to our own knee cap, has a ligament on each side, the inner of which is liable to over extension, thereby allowing the bone to slip out of place. As commonly met with, the luxation is but partial, and always in an outward direction. As the colt walks, the patella is heard to pump back into position with a click or clucking sound. Colts pastured on hilly ground are the most subject to it, owing to the strain put upon them, also the overgrown and weakly are predisposed to it. There may be little or no lameness at first, but if neglected the inner lateral ligament gets strained across the top of the thigh bone, and lacerated beyond recovery.

The symptoms are unmistakable—the sound can be heard distinctly and the movement noted. It may occur in both limbs at the same time, or in only one.

Treatment.—Having regard to the fact that it is only in moving that the slip occurs, we take measures to restrict movement as much as possible (we are, of course, speaking now of a case in its earliest stages). A smart blister, covering more than the area of the joint, is applied. The subsequent swelling and tenderness restrict the movements.

When the effects of a blister have subsided, a charge is recommended, and this should be left on until the natural moult causes it to fall off, unless another is deemed desirable, or the treatment has already had the desired effect. A colt so affected should, of course, be put on level ground, and during the first part of the treatment would be better kept in a straw yard where there would be no inducements to gallop about with others. (*See* Blisters and Blister Charges.)

LUXATION OF THE SHOULDER.

This is a very rare accident, and when it does occur a veterinary surgeon should be summoned. If one is not available, chloroform should be administered until the animal is perfectly insensible and the muscles relaxed, when it will be possible to extend the limb by cords attached to the knee and fetlock, while pressing upon the shoulder with one's stockinged feet. If this measure is successful the bone will be heard to go back with a click, and the previous deformity will as suddenly disappear. The chloroformed animal should be left to recover sensibility, and allowed to get up when he chooses, as he will be less likely to put it out again, or meet with any other accident in rising (*see* Anæsthesia, Chloroforming, etc.), than he would if encouraged to rise immediately

LUXATION OF THE FETLOCK.

Knuckling over is a familiar form of partial luxation in horses and other animals. It is generally a sign of over-strain or of excessive weakness (*see* Sprain or Strain).

DISLOCATION OF THE HEAD OF THE FEMUR.

This accident occurs to cattle and to dogs and cats. There is no treatment of any practical utility for cattle, but they will do for the butcher. Dogs and cats recover with a pitch plaster over the seat of injury.

DISLOCATION OF THE NECK.

One would suppose that such an accident was necessarily fatal, and would result in immediate paralysis from pressure upon the spinal cord, but there are several well-attested cases on record (the writer has seen one) in which horses with dislocated necks have walked home a considerable distance after the accident. They died subsequently, or had to be killed, as nothing can be done for a "broken neck."

DISEASES OF BONES AND JOINTS.

For convenience of description, bones are divided into long, round, short, flat, and irregular. The bones of the head are composed of plates, of which the external one is the most dense. Between them is a cancellated structure, and blood-vessels. On the outside of bones is a tough membrane, called periosteum, which is replaced at the ends, or articulating surfaces, by shining articular cartilage, a substance with which every reader is probably familiar. Long round bones serve as reservoirs of fat, known to all as marrow. Blood-vessels freely circulate in canals which extend from the investing periosteum, and assist in the formation of new bone. To this periosteum is ascribed the power of making bone from without inwards. The importance of the periosteum will appear when we consider the subject of splints and other body growths (*see* below).

INFLAMMATION OF BONE, OSTITIS.

The whole or any portion of a bone may be inflamed. It may be acute or chronic. The chief causes are external injuries, concussion, specific disease, or heredity.

An example of acute inflammation may be taken from the racing stable, where the disease known as "sore shins" often spoils the prospects of a favourite in training. The severe training, while as yet the bones are undeveloped, sets up inflammation, more especially near the lower end of the cannon bone.

Symptoms.—Slight lameness at first, tenderness, heat, pain, and swelling following.

Treatment.—Boldly lancing through the skin deep enough to prick the periosteum in several places, and thereby letting out the fluid which is pressing between the membrane and the bone.

A good dose of physic is also advised (*see* Physicking). Rest, cold applications, and, later, a mild blister (*see* Blisters). An example of chronic inflammation of bone may be seen in sessamoiditis, or inflammation of the sessamoid bones.

Navicular disease is also a chronic form of inflammation, resulting in ulceration.

SPLINTS.

This is the most familiar form of inflammation of bone and covering membrane (periosteum). They generally come on the inner side of the fore limb,

about a third of the way down, involving the cannon and splint bones, but they are also to be found on the hind limbs in corresponding situations, and, in rare instances, on all four legs, both inside and out.

Splints are to be found on any portion of the bone between the knee and lower end of the splint bones, which vary somewhat in length, but, roughly stated, extend two-thirds of the way down from the knee to the fetlock. A great variety of splints have been described, and will be seen in the illustrations. As a rule, the first indication a horse-owner has of a splint is lameness, not on coming out of the stable but on the road, and increasing with the continuance of the journey. With rest, the animal may come out again to all appearance sound, or the inflammation may have increased, and he will be found to be somewhat lame when trotted out.

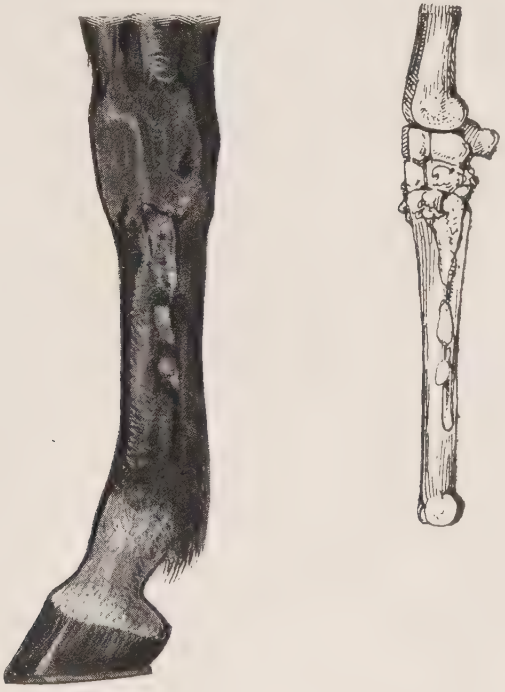


FIG. 77. SPLINT OR KNEE SPAVIN.
EXTERNAL APPEARANCE. SPLINT BONES AND KNEE SHOWING EXOSTOSIS.

Symptoms.—Lameness, and, as pointed out above, on the journey, or after exercise; not what is called a stable lameness, and passing off more or less when the joint oil flows and the horse "warms up," as it is said. This distinction is one to be particularly borne in mind by anyone who wishes to diagnose lameness, and the reader is asked to refer to Foot Lamenesses, particularly Navicular Disease, page 200.

Although a splint may appear at any age, it is among the young and in the first year of work we most expect to find them.

The tender spot is best sought while the foot is held up and the knee bent; running the finger along the edge of the splint bone and pressing upon the most likely portions. Pressure may cause the animal to flinch, or additional heat or throbbing may be felt. The absence, too, of all other likely causes of lameness, and the time of its occurrence at work, will help us to decide.

It is important to recognise it at this early stage, and before a bony deposit will make it obvious to the first stranger, who might be also a purchaser. At first it is but an inflamed area of periosteum, and possibly of bone immediately under it, and capable of removal by suitable treatment; later on it may, and probably will be, an immovable solid body.

Treatment.—A dose of physic (*see* Physicking); warm fomentations, hot bandages, and, after a few days of such treatment, a mild biniodide blister (*see* Blisters).

It has been argued that splints are supplied by nature to provide for a proved want, on the same principle as the rower's hands are provided with corns when the ordinary skin has been found too soft for his purpose. The argument is supported by the fact that small-boned, heavy-bodied animals are the most prone to splints. The support between the splint bone and the cannon bone we may be glad to accept as a present from nature, but she is too liberal, and provides a surplus in the form of a lump outside, which we wish to get rid of, or, better still, prevent its formation. The treatment above suggested will have the latter effect, if taken in time. If that time has passed, and a bony deposit already exists and causes lameness, we have to consider what means to adopt to reduce it, or assist nature in accommodating the parts. If the animal is not lame and the ossific deposit is not increasing in size, we had better let it alone. The policy of "let sleeping dogs lie" is one to be invoked in regard to splints and other bony deposits, when they do not interfere with the usefulness of the subject of them. There is too often a disposition on the part of amateur doctors and inexperienced dealers to attempt the improvement of horses by removing splints with the aid of some advertised nostrum. The result oftentimes is to rouse the sleeping dog, and excite lameness, without in any way diminishing the splint or other growth. In some cases it is excited to greater effort, or the skin is literally killed, by the corrosive sublimate and other violent remedies which the irresponsible quack supplies, and many a permanent blemish is to be seen in consequence of such interference. If left entirely to nature a splint would presently become callous or insensitive, and lameness pass off. Splints form on colts at grass, and give rise to so little lameness that they are often not detected until offered for sale and examined by an expert.

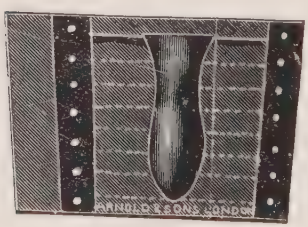


FIG. 78. SPLINT BOOT.

There are two positions, however, in which splints are to be regarded as serious—close to the knee, especially when "pegged" or showing on both sides, and when far back upon the cannon bone, and therefore in contact with tendons or ligaments, and giving rise to friction. Knee splints may "creep" or grow upwards and involve the knee joint. They are sometimes called knee spavins in this position (*see* Blistering, Firing, &c.).

JOINT ILL IN THE YOUNG (INFECTIOUS).

The swelling of joints in sucking animals, their subsequent suppuration and frequent death, is caused by an organism which enters the open navel. The preventive treatment is the same as for navel ill and for infectious scour, which see.

To a large extent the germs may be kept out by ligaturing the navel string close up to the belly, and painting the stump with one part of carbolic acid to twelve of collodion. One part in five hundred of water, perchloride of mercury, is suitable for dealing with large numbers, and a solution of this

strength can be kept in stock by breeders outside the range of veterinary surgeons. When further diluted with three or four times its bulk of water it can be used for irrigating the genital canal or injection into the udder in cases of garget, and for many other purposes is a useful antiseptic and disinfectant.

Although the navel is the chief port of entry, there are others which we cannot blockade, and with all precautions exercised, a few cases will occur from time to time.

Treatment has hitherto been very unsatisfactory, but great hopes are entertained of the new serum-therapy or so-called vaccines, both for the prevention and cure of this malady.

Some measure of success has resulted from hypodermic injection around affected joints with a solution of 4 per cent. formalin and the inunction of an ointment composed of one part of iodine in sixteen parts of lard. If the strength of the young animal can be kept up, he may recover, but the mortality is very high.

When our knowledge of vitamines has made such progress that the chemist can produce them from their natural sources with certainty, supplying a formula, and providing us with " something in a bottle," there will be immense strides made in curative medicine, and the thing lacking will be given, as in the case of pigeons that were paralysed through feeding on polished rice, and restored in a matter of hours when provided with the vital principles residing in the husk. Then, too, our next subject, rickets, will have lost its terrors, both for the pallid child of the slums and for our domesticated animals.

RICKETS, OR SOFT BONES.

Foals, calves, puppies, and other young creatures are liable to deformity through softness of the bones, which bend beneath the weight of the animal. There is a disproportion between the mineral and gelatinous parts of the bone. It may be that the young creature is unable to assimilate and appropriate the necessary material, or that it is wanting in the dam's milk, or the food supplied. With regard to puppies, the absence of sufficient daylight is a well-known cause, as in those litters bred in dark or underground stables. The need of exercise is now held to be the chief cause, but it is likely that all are contributory. (*See* previous paragraph on vitamines.) As the front limbs sustain the greater part of the weight in all the domesticated animals, the long bones of the anterior limbs are the first to show deformity. The heavy-bodied dogs, as mastiffs, St. Bernards, bull dogs, and spaniels, are the most prone to rickets. The bending of the legs of newly-born foals must not be mistaken for rickets: it is chiefly due to the relaxed state of the ligaments and tendons. It is unfortunately too true that a bent bone due to rickets never gets absolutely straight again, but nature puts in special stays at the weak parts, and when the full growth is attained there is only a slight deformity, but an invariable thickening of the once weak portions. Crooked breasts in fowls are more often due to rickets than to high perches.

Treatment.—Supply the supposed deficiency in the diet; place the patient in the most health-giving environment. In the case of foals and calves, we may put them on another dam, or give them the milk of a well-known mother which is above suspicion. To it we may add a portion of lime water, and perhaps some compound syrup of the phosphates. A foster mother should be found for puppies, and a proportional dose of lime water and phosphates (*see* Table of Doses), not forgetting the importance of sunshine and play, together with a liberal diet. Rickets more often shows itself after weaning, than before, in dogs, owing to missing the enzymes in milk while suckled. Their greediness can be taken advantage of by feeding more than one dog

out of the same dish, when some not very palatable medicament has to be given in the food.

It has been observed that rickets in foals is most frequent among working mothers, absent the greater part of the day from the foal who gorges himself when he can, frequently with the result of scouring. So also with calves brought up by hand and suffering from the white skit. Proofs indeed of mal-nutrition.

OSTEO-POROSIS, SPONGY, BONE, ROTTEN BONE.

A disease of bone which, when examined, has the appearance of a living sponge. It is enlarged, soft, easily crushed in the hand, and bloody. It most often affects the bones of the head, particularly the jaw bones of horses and cattle, but in sheep the long bones are as often involved. On poor reclaimed lands, and only in particular districts, it is observed, and is thought to be due to some deficiency in the soil.

Treatment.—Remove the animals to a healthy pasture, and give linseed cake and crushed corn. A generous diet is a cure for it, if not too far advanced, and is certainly a preventive. Anyone occupying such land should therefore be prepared to supplement the pasture with purchased foods, or not hold it. In the case of sheep, the disease may not be detected until one or more are found with broken limbs, without any accident to account for it.

BRITTLE BONES, FRAGILITAS OSSIUM.

Rickets has been described as a disproportion of mineral and gelatinous material in bones: an insufficient amount of the former. Brittle bones are caused by the opposite condition: an excess of earthy or mineral matter. There are two principal causes, degeneration of the animal basis, and inflammation of the bone. It is a state often met with in extreme old age, and can then hardly be regarded as a disease.

As it is seldom recognised during life, no remedy can be suggested.

JOINT INFLAMMATIONS, OPEN JOINTS, JOINT-ILL.

The diseases affecting joints—other than those produced by accidental injuries, are treated of in connection with inflamed bones (*see* Actinomycosis, Tuberculosis, Stifle Joint Lameness, Luxation of Joints, Partial Dislocations, Joint-Ill, Rheumatism, Anchylosis).

Inflammations not connected with either of the above diseases are in animals nearly all due to external violence. A joint may be laid open by a cut, kick, or blow from a sharp or blunt instrument instantly, or the injured tissues may subsequently give way, resulting in

OPEN JOINT.

The consequences of opening any joint to the atmosphere are much the same, and the remarks to follow will apply as much to a broken knee when a horse has fallen and laid open the capsular ligament (*see* Broken Knees) as to a bullock, sheep, pig, or dog which may have been stabbed with a stable fork, or lain down upon a broken bottle. The trouble that follows will be the same in principle, and the treatment applicable alike to all, save for the special circumstances which enable us to sling a horse and prevent us from restraining a dog or pig from pulling off bandages with its teeth.

Symptoms.—Extreme lameness and intense pain characterise joint injuries. Bodily temperature is increased, and there are all the signs of fever. The discharge of joint oil will not at first be recognised, probably; it resembles dilute glycerine in colour and consistence, until atmospheric air has been admitted for a time, when it assumes a deep golden or saffron hue and is unmistakable. Soon it coagulates upon the lips of the wound, and a thin watery discharge,

mixed with flakes of lymph, oozes through it. The swelling is also enlarging, and abscesses may form at different points around and below the injury. The originally soft swelling becomes hard, and, in cases which recover, never quite fines down again. It is desirable to avoid probing a wound where injury to the enveloping membrane (capsular ligament) is suspected.

Treatment.—Many subjects of open joint are not worth treatment, and should be put out of their misery and any further expense avoided. Only a veterinary surgeon can decide this, and *he* may be easily mistaken. Before anything is done, the owner should clearly understand that the case will be a long one, involving much trouble and considerable expense for maintenance, apart from any doctor's bill that may be incurred. Unless, then, the animal will be of some value, either for slow work or breeding purposes it will be most likely the wisest course to destroy it. This must, of course, be taken to refer to horses. Cattle may have a butcher value if killed at once, or a breeding value if they recover, despite a permanent stiff joint. A pig will fatten as well with a stiff joint if he is of sufficient value to be kept during the time of treatment (which is doubtful), and a dog can make shift with three legs, as a rule, and put in a fair day's work too, if he happen to be a sporting or valuable sheep dog. If the injured member is a front leg, there will be very much less wasting of the body than if a hind limb is the sufferer. This is an important fact to bear in mind, and may make all the difference as to the desirability of treatment or the pole-axe. The wasting that follows in an average store beast with, say, an open hock joint or stifle will be so great that he will never repay the cost, and he had better be killed before a high temperature makes him unfit for human food.

A purgative dose should be given with the object of keeping down temperature and preventing the constipation which accompanies fever (*see* Purgatives).

The lips of the wound should be drawn together with sutures, previously dressed with an antiseptic.

Horses should be put in slings. The utility of slinging cattle is doubtful; it answers, however, for a short time, if there is not too much abdominal pressure. We have the advantage, with these, of being able to keep them in health, although for a long time on the ground, while it is a matter of common observation that a horse will die if long unable to rise. Sheep, pigs, and dogs may be bandaged, and in several ways restrained (*see* Methods of Restraint). Our prime object is to keep out air, and the germs which go with it, and our next concern is to promote union of the parts while keeping down fever and relieving pain. We therefore employ an antiseptic that is not irritating, as 1 per cent. solution of chinosol, or one per 1,500 bichloride of mercury when dressing the wound, and this dressing may be injected into the orifices from which matter is outpouring. This performance should never tend to keep open a wound, and the nozzle of the syringe should be small. The surface should be covered with some substance which has a tendency to coagulate albumen and form a varnish or coating. White of eggs is a good thing to lay on with a soft brush, and immediately afterwards a weak solution of bichloride of mercury. Collodion is also advised. The writer has used everything of the kind that has been recommended, but obtained better results with a thick paste of whiting and methylated spirit of wine than with any other dressing.* This may be applied over the last dressing when the early agony and acute symptoms begin to subside, so that a crust of sticky whiting forms and the discharge finds more and more difficulty in getting through it, and finally the joint is sealed up. The inflammation continues after the

* Since the above was written, the author has had even better results from a mixture of 5 per cent. iodoform in tannic acid, dusted on to the wound every two hours.

healing up, and some have recommended cold water at this stage If the accident happen in the winter, the constant cold air when the animal is turned out appears to benefit him largely, but the application of cold water at intervals is not, in the experience of the writer, any good. A blister does more for the reduction of a big joint at this period than anything else, but it needs great care to avoid using it too strong and reopening or injuring the newly joined tissues. In writing for farmers, one is disposed to presume on their well-known patience and optimism, as well as to bear in mind the fact that the occupier of land can sometimes afford to hand over a case to Drs. "Time" and "Green," where the cost would be prohibitive to a townsman. The writer has also in mind cases, apparently hopeless, which have recovered under the above-named eminent physicians, when owners less patient would have sent for the knacker, and thereby lost the services of animals which have proved useful for many years afterwards.

DROPSY OF THE JOINTS.

Due to an excessive amount of synovia or joint oil, and of improper consistence. Joints, as has been elsewhere stated, are surrounded by a capsular ligament or band containing the fluid which lubricates them and prevents friction. Anything which interferes with the quality of this fluid may render it excessive, and the neighbourhood of the joint is seen to be enlarged. Young, fast-growing horses of the heavy sort are frequently troubled with these dropsical joints, particularly of the hock, and taking the form of bog spavin and thoropin.

The fetlocks, knees, and stifle are sometimes affected in the same way, but they generally grow out of it, if not put to work too soon or made to overexert themselves.

Treatment.—Good feeding, restricted work or galloping ground, and blisters.

ANCHYLOSIS OR STIFF JOINT.

By this we usually mean a joint whose function as such is lost, by reason of the bones of which it is composed being permanently united by the products of inflammation. Surgeons make several distinctions or degrees of anchylosis, but for our present purpose we may point to a bad case of ringbone as typical of anchylosis, the long and short pastern bones being more or less surrounded and joined together by a bony deposit so as to preclude any movement of one bone upon the other.

Horses are of very little value, although of some use, when so affected. A stiff joint is looked upon with suspicion in pedigree cattle, but may not depreciate the value of cross-bred animals, either for grazing or milk production, but most farmers will be glad to take a fair price of the butcher, and to see the last of a cripple of the kind. Whether in horse, ox, sheep, pig, or dog, no treatment is of the least avail.

Diseases of the Hock.

BOG SPAVIN AND THOROPIN.

Bog spavin is an enlarged condition of the hock upon its inner and lower aspect; it is soft and fluctuating, and dependent on a distended state of the whole joint with synovial fluid, but (for anatomical reasons) bulging at this particular place.

When the distension is more than usually great, and the capsular ligament or oil-containing sac is bulged in still another direction, that between the tendons, just above the joint, it is called thoropin, although such a condition is not exactly what veterinary surgeons mean by the term.

Thoropin is a bursal enlargement. The bursa or synovial sheath of the flexor pedis perforans is inflamed, and secretes an abnormal quantity of fluid of probably abnormal quality.

FIG. 79. HOCK PAD BANDAGE FOR WOUNDS (*Huish*).

If the swelling is pressed first on one side and then on the other, it will be seen to bulge in a manner suggestive—to those at least who first named it—of a pin or bolt run through from one side to the other. To anyone with the most elementary knowledge of the structure of animals it seems a rather fanciful name, but it is as much like a peg or pin as the soft portion of a horse's foot is like a frog. We have to accept these names because handed down by farriers and cow leeches, until someone with both originality and influence can invent better ones and secure their adoption.

The causes are over-strain, especially when growing fast and put early to work. In some of the heavy breeds of horses there would appear to be an unequal growth going on, as between the hard and soft structures of the joints, and we have seen many three-year-olds with what would be called bog spavins and thoropins that have subsequently disappeared without any interference. It must have been with such subjects in his mind that the late Professor Dick spoke of them as "mere *stores* of synovia for lubricating the joint, thus proving the best preventives of disease by preventing friction." Without endorsing the Professor's view altogether, the writer can do so as regards many Shire colts. Conformation has much to do with the formation of bog spavin and thoropin.

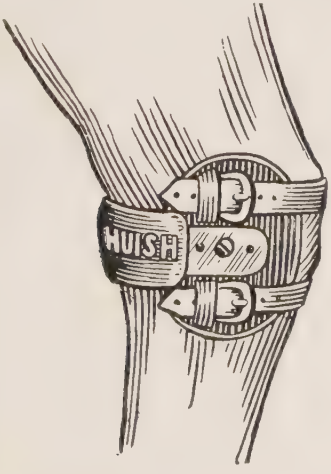


FIG. 80. THOROPIN TRUSS (*Huish*).

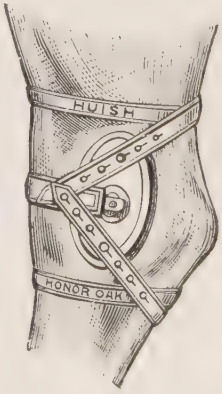


FIG. 81. TAYLOR'S THOROPIN TRUSS (*Huish*).

Treatment.—This should be with a view to allaying any inflammation—first by a purgative dose (*see* Physicking), and then by pressure. The pressure of an elastic bandage is the ideal form—gentle, continuous, and perhaps increased; but it is not practical in general. In the private stable of the gentleman, with a veterinary surgeon constantly in attendance, it may be so nicely regulated, or a truss made for the one or the other condition (bog spavin or thoropin) may be kept on constantly, but for the average horse-owner and farmer some plan must be adopted which will cost less of time and trouble. The blister and the blister charge, then, are usually recommended, or in extreme cases the firing iron very carefully run over the parts (*see* Blistering and Firing).

FIG. 82.
THOROPIN BANDAGE.

A run at grass or straw yard rest is advised. Youngsters, as previously hinted, recover often with or without treatment, but a return of the swelling is a common experience in most mature horses after they get back to work.

Upon the degree and extent of these troubles depends the professional examiner's decision as to the subject being sound or unsound, or on the border line. It is a weakness or defect, and unless very small should be deemed unsoundness. Yet it is a fact that but few horses ever fall lame of bog spavin or thoropin. They may be lame of a spavin at the time it is incurred, or when the disease is very advanced, and probably complicated with others, but simple distension of the hock joint, and of the form known generally as bog spavin or as thoropin, is not usually associated with lameness.

BLOOD SPAVIN.

Old writers and farriers used to distinguish between bone spavin, bog spavin, and blood spavin. Bog spavin has been considered above, and bone spavin below. It remains only to be said that there is no such thing as blood spavin, unless we accept a varicose or distended condition of the vein (vena saphena) at or near the seat of bog and bone spavin (and caused by the pressure of those abnormal conditions) as separate spavin; which it is not.

SPRUNG HOCK.

This is an inflamed hock suffering from sprain of the interosseous ligaments but not confined to them. The extent of the sprain can never be definitely ascertained. It is only to be roughly measured by the subsequent effects.

The symptoms are great pain and inability to lie down, or perhaps fear and partial inability combined. Heat and tenderness on pressure; swelling; fever. The subject of it will soon look "tucked up," and some even die from the pain, fever, and restlessness occasioned by long standing.

The treatment usually advocated is a physic ball and cold applications, while placing the animal in slings to avert weariness and the tendency to laminitis which is noted when horses are compelled to stand with any inflammatory disease (*see* Fever in the Feet, or Laminitis).

After the first acute symptoms have subsided, the hock is blistered and the animal turned out for a long rest. It is doubtful if the old-fashioned

and apparently cruel method of treatment was not more successful, and that was blistering severely at first. By such treatment the inflammatory action within was thought to be lessened or withdrawn (*see* Blisters, etc.).

Those cases which never recover are generally due to ulceration of the articulating cartilages or of the bones composing the joint itself. More frequently a sprung hock consists in strain of some of the inter-osseous ligaments, and these are repaired with sufficiently long rest.

BONE SPAVIN, OR SPAVIN.

Spavin is situated on the inner and lower portion of the hock joint, and not between the two large bones which enable the leg to bend at this part. There are rows of small bones in the hock as well as the knee, serving to diminish concussion. Despite this arrangement, concussion and inflammation sometimes occur, and the result is a deposition of bone on the spavin place, and involving two or more of the small bones which lose some of their mobility, and cause pain and lameness when put into action.

The higher the spavin and the more forward its position on the hock the more serious is it, since the movement is most felt in front as the result of bending the hock.

Young horses have often so-called "coarse hocks," in which there is a temporary excess of bony material. Disputes frequently arise in such cases; some veterinary surgeons of little experience condemning them as unsound and spavined, while others are willing to pass them with a remark to the effect that they are coarse, but not likely to prove detrimental to the animal. Many such hocks prove the most capable of bearing the severe strain of jumping with a weight on their backs or of draught work in the case of the heavy breeds.

The existence of an undoubted spavin must be regarded as unsoundness, and in horses over six years old as in all probability incurable. While concussion is the all but invariable cause of spavin, conformation is important as predisposing to it.

Hocks described as "tied in" are the most liable; the reason being the smallness of the cuneiform bones, and the lesser surface over which concussion can be spread; the coarse hock being exactly the reverse, and chiefly due to large cuneiform bones affording a greater surface over which to spread it.

Symptoms.—A want of freedom in bending the hock, a disposition to wear out the toe of the shoe, a slight stiffness in coming out of the stable, especially after a hard run or severe labour the previous day. The stiffness or catching up of the limb can be best seen, and in some instances only seen, when the animal is made to move across the stall and from side to side. This movement in the stable may be mistaken for stringhalt. Spavin lameness frequently disappears with exercise, and sellers take advantage of this to keep their horses warm while under inspection. The best time to examine an intending purchase is the first thing in the morning, before the animal has been out at all. It is also necessary to decide quickly as to the presence or otherwise of spavin, as the stiffness will pass off, possibly while the subject is trotted up and down a few times. At the point of turning we should particularly note how the hocks are used, and reverse the turns each time (left about and right about turn), as, if lame on one side only, advantage may be taken to turn on the sound side. The downhill pace is helpful in diagnosis, especially if the animal is ridden, when he will drag his toes more or less. One of the best tests in a horse that has already been warmed up for show is to take the leg in one's hand and bend it up as far as possible, holding it in that position as long as for a full minute (if permitted by the seller), and

from calling upon the animal to act immediately. If spavined, he will show lameness under these circumstances more than under any other. Chronic spavin may be easily visible and yet not give rise to lameness, while an occult but forming spavin may do so.

Treatment.—The importance of early attention cannot be exaggerated. A dose of physic, a cooling lotion, and a few days' rest may settle the lameness, soundness or unsoundness of a young horse with symptoms of spavin lameness. To allay inflammation must be the essence of whatever treatment is adopted, and that already suggested is probably the best, although some would prefer warm fomentations or a compress. Rest is the chief thing, and there can be no doubt that a good dose of physic (see Physicking) has an immediate influence on the part inflamed. With the subsidence of the first inflammation, that is to say, in a week or two, as the particular case may indicate, a counter-irritant will be desirable. A fairly strong blister with biniodide will probably be best (*see* Blisters).

FIG. 83. BONE SPAVIN.
EXTERNAL APPEARANCE. BONES OF HOCK SHOWING EXOSTOSIS.

Many experienced horse-owners, on the diagnosis of spavin being confirmed, lose no time in having the hock fired, and subsequently blistered, as they hold the opinion that both absorption as well as binding against future weakness is best obtained by adopting the most rigorous measures at first. Perhaps, in a stud of hunters kept by a rich man, with no intention of selling, this may be the best policy, but with most folks there is a preference for trying remedies that do not leave indelible marks. Puncture firing leaves less blemish than line firing, and has its advocates; in my own experience it is nearly always a failure, and occasionally results in sloughing and most serious disasters to hocks. If the blemish has to be incurred at all, it had better be thoroughly done, but one need not fire until a strong blister and rest has already failed. It should be remembered that spavined horses work best in a high-heeled shoe, and that many do years of useful labour if properly looked after.

OCCULT SPAVIN.

There is a form of lameness, said to be due to occult spavin, in which there is no outward visible or palpable bony growth or enlargement. Examination of dead subjects shows ulceration of the surfaces of the bones. In ordinary spavin the original inflammatory process is followed by a reparative one, in which friction and destruction of tissue are stayed by the joining together of the small bones and obliteration of what was once a joint, albeit with but

a very small sphere of motion. In occult spavin, no such reparative process occurs, and the disintegration continues without hope of repair. Such cases are commonest among old horses, younger ones in this, as in other diseases, having more natural recuperative or reparative power. No treatment is of use.

CAPPED HOCK.

Two forms of capped hock are recognised by veterinary surgeons, the common one being nothing more than an enlarged bursa, like windgalls (*see* Windgalls), and the other of a more serious nature, because deeper seated and a cause of lameness.

FIG. 84. CAPPED HOCK.

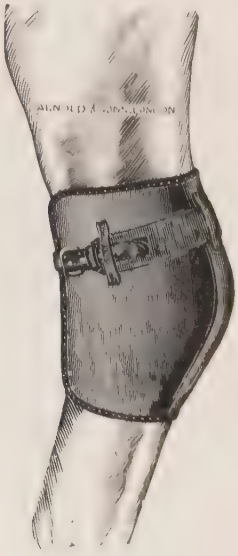


FIG. 85.
HOCK CAP TRUSS.

The ordinary form of capped hock is not deemed an unsoundness, but all will agree as to its unsightliness.

Causes.—It generally arises from insufficient bedding or bad and uneven floors, or from kicking against the stall post. Some horses have a habit of scraping away their bedding, no matter how they may be provided with straw or other suitable material.

Treatment.—Withdraw the cause if possible. Trusses are made for such animals as persistently cap their hocks afresh, and these are supplied by saddlers. In the first stage a capped hock is soft and fluctuating, and much may be done to get rid of it by gentle manipulation with a weak liniment. If it is once allowed to consolidate, nothing will afterwards cause its absorption, and the application of blisters which one often sees only adds to the unsightliness by thickening the skin and rendering the hairs coarser.

In buying a horse with a capped hock one should look carefully for scars just above and below the cap, as the animal may be a kicker and have brought the trouble on himself by vice.

The following have proved very useful applications for capped hock, and should be gently rubbed into the enlargement night and morning.

1.		2.	
Soap liniment	- 1 oz.		
Methylated spirit	- 1 ,,	Tinct-Iodine	- 1 oz.
Tincture of arnica	- ½ ,,	Soap liniment	- 3 ,,
Tincture of opium	- ¼ ,,	Water	- 4 ,,
Water to one pint.			

To be used once daily with gentle friction.

Synovial capped hock is an unsoundness, and may result in partial death of the bone at the point of the calcis. It is, however, rare.

CAPPED ELBOW.

Capped elbow, like capped hock (*see* Capped Hock, above), is an enlargement of the bursa or oil sac on the point of the elbow, and generally contracted by

FIG. 86. CAPPED ELBOW PADS.

FIG. 87. CAPPED ELBOW PADS (*Huish*).

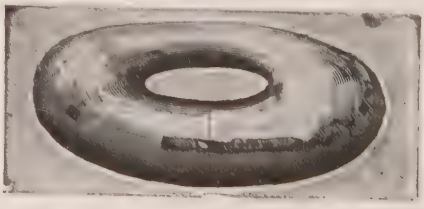


FIG. 88. CAPPED ELBOW PADS.

lying on the point with insufficient soft bedding. It is therefore more often found in stables where the flooring is uneven, and upon horses with the habit of scraping back their beds before lying down. Most horses do a little pawing with the front feet previous to going down, but some habitually miscalculate the length of their lead and rest on a bare spot although allowed plenty of straw. It is also caused by the heel of the shoe, and is called shoe boil in America.

Treatment.—If not caused by the habit above referred to, and while quite recent, the swelling may be induced to subside by the frequent gentle rubbing in of the weak liniments advocated for capped hock above.

When the contents of the tumour have become solidified no outward application will be of any service, but custom still prescribes a blister. My own experience is entirely against blistering and in favour of removing all pressure by an elbow pad, invented by a coachman and sold by all saddlers. Setons and destructive injections have been employed successfully, but they take a long time to effect a cure and are often unsuccessful. If the tumour is allowed time to become solid it can be effectually removed by a long bold incision through the skin and dissecting out. The outsides of the skin may be dressed with a mild blister, as this makes the union more rapid and leaves less thickening of the skin. The operation is usually successful, and the tumour does not recur.

CAPPED OR ENLARGED KNEE.

The bursa or oil sac just above the knee, in front, is sometimes struck or otherwise inflamed, and a soft swelling follows of the same kind as windgalls, capped hock and elbow, and the treatment advised for the two latter (*see* previous pages) can be recommended. Pressure may be added in this case if bandages are first built up below the affected portion of the limb. (*See* Treatment of Broken Knees.) *See* also Housemaid's Knee in Cows.

WINDGALLS, DROPSICAL BURSÆ.

Soft swellings on either side of the fetlock joints are known by the name of windgalls, but they do not contain air. They are little oil sacs when healthy, and their office is to lubricate the parts and facilitate the passing of tendons over bones or over one another. When by hard work or inflammatory action in adjacent structures these sacs are interfered with and inflamed, the secretion is perverted. It is excessive in quantity and not of normal quality. These little oil depots are distributed all over the animal wherever friction is to be anticipated, as at the point of the hock, the elbow, the front of the knee and fetlock, and at the sides of the latter, where enlarged bursæ are most common, and known under the name of windgalls.

FIG. 89. WINDGALLS.

The inflamed bursæ in any of the positions named above rarely give rise to lameness. Horses with windgalls are everywhere to be seen going sound, and the presence of such swellings is regarded merely as a sign of work and wear. They are not to be regarded as unsoundness save in exceptional cases, as for instance when large or hot to the touch, and therefore liable to inflammatory changes resulting in consolidation, interference with adjacent important structures, etc.

Treatment.—If a young horse shows windgalls on being first put to work, it may be worth while to blister his legs and turn

him out again, as by such treatment he may thereafter keep free of them, but under any other circumstances the blisters and the rest will only act temporarily; the swellings will come again as soon as the animal goes to work. The majority of horse owners are content to let windgalls alone, but a good stableman will bandage at night and so keep them from getting worse. A fairly tight bandage will cause them to disappear in a night unless very bad ones, and the galls do not refill for a while. This is a distinct gain, and should not be forgotten.

TIMBER LEAP.

There is a bursa on the front of the fetlock which is so often struck and inflamed in the act of jumping walls and rails that it goes by the above name. Treatment is the same as for other injured bursæ (*see* Windgalls, Capped Hock and Capped Elbow).

CURB

Is a sprain at the back of the hock. The chief ligament involved is that known as the calcaneo-cuboid. The injury is best seen by looking at the hock from the side—in profile, and comparing it with a known sound hock.

Symptoms.—Lameness, amounting in many cases only to stiffness and impaired action in flexing the limb. Upon the degree and extent of the sprain the subsequent treatment must somewhat depend, but it is probably the best plan to blister at once rather than adopt palliative measures, such as warm fomentations and mild or even strong liniments. Slight curb will, it is true, soon be cured, so far as any lameness is concerned, but there will remain an enlargement which the expert will always detect, and consequently a depreciation in value, whereas an active blister, promptly applied, will make it difficult, after a few months, to find any decided symptoms of curb. Whether curb is to be put down as unsoundness or not will depend both upon its extent and the class of horse. A hunter or charger will need to pass a closer scrutiny as to curb than a carriage or draught horse, since their work puts a severer strain upon the hocks in jumping and reining up short. After a blister, turn out (*see* Blistering). A high-heeled shoe should be put on immediately a curb occurs, as it relieves the tension on the structures involved.

It was formerly a custom in some hunter-breeding districts of Ireland to fire the seat of curb as a precautionary measure, but this practice has almost fallen into desuetude.

Chapter XV.

WOUNDS AND THEIR TREATMENT.

There are certain general principles to be laid down with regard to wounds and their treatment with which every owner of animals should be familiar. They are based upon a sound knowledge of anatomy, or the structure of animals; physiology, or the functions of the various parts of the animal machine; and experience of the methods which Nature adopts to effect repair of injuries.

There is no sovereign remedy suited to all wounds and injuries, any more than there is one medicine calculated to cure every form of disease. Though surgeons make a great many distinctions, and the schools revel in nomenclature and microscopic examination of the processes of repair, and the composition of the products of inflammation, there are certain broad divisions to which simple rules are applicable, and within the comprehension of persons of ordinary intelligence, who do not wed themselves to a particular nostrum, but seek to determine the nature and extent of an injury, and apply those elementary principles which experience dictates.

THREE CLASSES OF WOUNDS.

It is convenient to divide wounds into three classes—incised or clean cut, as when a knife slips in cutting a clean substance and wounds the hand of the operator; contused or crushed, as when a heavy instrument breaks open the flesh; lacerated or torn, as, for example, when a portion of a living creature is caught in machinery.

A clean incised wound in man or beast needs only to be brought together in the shortest time possible, retained by mechanical means, and kept at rest, while Nature repairs the breach.

The almost universal practice among amateur surgeons of bathing a wound with warm water is to be deprecated, on account of the facilities such a plan offers for the entrance of germs which are always to be found in air and water, and to whose malevolent influences nearly all the subsequent trouble is due. While the bathing proceeds the divided vessels are closing up their ends instead of bringing material to mend the breach and form an immediate adhesive union, pending the development of more lasting material. It is easy enough to account for this popular practice, which originated in the desire to cleanse a wound from gravel or other foreign matter, and was perpetuated by the hot and cold water school of surgeons, which preceded the era of antiseptic surgery, of which Lister and Gamgee were the earliest exponents, among men and animals respectively.

THE OLDER TREATMENT.

Until the higher powers of the microscope provided us with definite knowledge of bacteria, and their cultivation in suitable media enabled us to ascertain with certainty their effects upon the animal economy, the treatment of wounds, so far as medicinal and not mechanical means was concerned, was merely empirical or experimental.

The friars had discovered, by carefully tabulated results, that such combinations as friar's balsam were "good for" wounds, but they knew not why. Now we know that one and ingredients of that long-famous household remedy are of a germicide character; the microbes, which are ever ready to

invade a wound, cannot live in its presence, or at least fail to multiply in the rapid manner of their kind. It is, therefore, an antiseptic, a preventive of disease germs from entering a fold in which they can find pasture.

Incised wounds may be of any size and extent, from a small cut with a pocket-knife to a deep gash with a sword; it is their character, not their extent, which brings them within this category.

In the ordinary way a clean knife will not carry germs, and the wound should be pressed together and simply bound round in its own blood, if a small one, and with no other agents at hand. The clot which will quickly form affords a light protection, but it is not sufficient in the majority of cases to bear the strain and movements of a limb without reopening.

SIMPLE TREATMENT.

A large proportion of simple cuts and wounds may be successfully treated by the application of carbolised oil, in the proportion of one in twenty or thirty, or any of the recognised antiseptics. Bound up in cotton wool or soft old rag saturated with this lotion, which should be found in every farmhouse, very few wounds will give trouble afterwards.

Though "not so deep as a well or so wide as a barndoor," an incised wound may be of such extent as to need more holding together than is afforded by a simple bandage or strip of plaster. The latter is always in the mind of the amateur vet., but is practically useless in the case of animals, as the hair upon the skin lifts off such bindings, even though previously shaved by way of preparation. If a limb or part of an animal is wounded where a bandage can be passed around it, plaster is not required; and if on the side or flank, for instance, it will not hold, for the reason previously given. There is no real virtue in adhesive plaster; it is merely a means of sticking parts together, and, though suitable in some finger injuries to man, may be discarded as useless in almost all instances in the case of animals. The latter do not suffer from the fear of anticipation and faint at the sight of the surgeon's needle, but they do employ their teeth, and in the case of dogs and cats their feet, to undo our appliances. It is best, then, in a wound of any considerable size to resort to the needle at once. The skins of animals are not easily pierced, and sewing needles are useless, save for the thin and hairless parts under the thighs, etc. In the absence of a surgeon's needle, a glover's three-sided instrument may be used, or a small carpet needle may be filed on three sides and made to do. This, as well as the thread or string employed, should be soaked in the carbolic oil, or any other antiseptic, unless a cat happens to be the subject, when no trace of carbolic acid should be used.

STITCHES OR SUTURES.

Stitches or sutures should be given plenty of hold; it does not hurt an animal any more to give a bold prick through a good margin of skin than it does to stitch close to the edges, where, in a day or two, the swelling is likely to cause the sutures to tear out and necessitate their replacement under worse conditions, and when the adjacent parts have become more sensitive from inflammatory action. As a broad rule, it may be taken that single or "interrupted" sutures are the best, as the breaking away of one will not allow the wound to gape, as will be the case when a running thread comes undone. Each stitch should be fastened off as a knot, as it will not require to be untied, but cut, when the time comes. Sutures should be left in until the wound has united, but it is a good plan to remove the lowest after a day or two where a prospect of drainage can be so obtained.

Wounds requiring stitches at all in all probability have to form matter, or suppurate as it is called, but surgical wounds, as those made in spaying,

etc., are often found to heal by adhesion, or simple union of the edges when in proper apposition.

There is a great distinction to be made between these two processes of healing by adhesion, or by suppuration followed by granulation. In the former, no matter is visible to the naked eye. In the latter, there will be yellow thick pus which indicates the formation of red granulations beneath which will eventually reach the surface, carrying miniature arteries, nerves and veins for future use.

We speak of a "healthy wound" although thick yellowish matter is exuding from it. Such "laudable" pus is to be distinguished from a reddish frothy fluid, which does not mean granulation below the surface, but likely enough burrowing, and the formation of fistulæ or pipes.

With healthy progress, the matter grows thicker daily, but less and less in quantity. The surgeon's experience teaches him when to expect the granulations to reach the level of the wound, and to repress them if disposed to grow too luxuriantly as what is commonly known as "proud flesh," and should be repressed by the application of caustics, as nitrate of silver, sulphate of copper, or chloride of zinc, or even corrosive sublimate if very persistent.

Every day on the road one sees examples of neglected proud flesh in the knees of horses which have been down. Those treated without surgical knowledge have large blemishes and often lumps upon the seat of injury, but broken knees properly attended to by a competent veterinary surgeon will leave but a minimum of blemish and no enlargement. As the manner of its accomplishment applies generally to granulating wounds, we may here imagine a broken knee when the preliminary trouble is over and the case approaching completion, for this is the time when the vet. can do so much to reduce blemish (if he has not grown tired of calling, or his employer of seeing him) by running over the granulating surface with a stick of nitrate of silver (hardened points are sold for the purpose); leaving it a couple of days, then scratching off the new-formed scab with the finger nail, or bathing it off; reapplying the silver stick and allowing another scab to form, only to be removed in the same way a few days later. By this means the tendency to produce soft flabby granulations or proud flesh overlapping the level of the skin is done away, and the new growth is dense, close, and strong. The skin more nearly approximates each time the scab is removed, and in the end what was a great gaping wound is made to "piece-up" with a blemish no bigger than a shilling. Any wound that grows up too freely, or has so-called proud flesh, should be thus treated; it is a perfectly safe and most desirable thing to do. Nitrate of silver is the best of caustics for forming a dry scab which is intended to be removed and replaced, but other substances less costly, as blue-stone and burnt alum, may be used for general repression.

CONTUSED WOUNDS.

Contused or crushed wounds require different treatment in the early stages, any tendency to acute inflammation and possible death of tissue being combated by plentiful fomentation, poulticing if the situation will permit, and any remedy that will reduce pain, encourage swelling, and afford the blood opportunity of circulating freely in the bruised parts. Bleeding from such wounds is even desirable, unlike the simple incised wounds previously referred to.

When the first intense inflammation has passed, the wound will require some such treatment as that previously described for large incised ones, where suturing is needed, pus formed, and subsequent excessive granulation kept in check.

Lacerated or torn wounds present difficulties distinct from those previously described, as there is not only division of the skin and flesh, bruising or contusion, but tearing of the tissues in a manner calculated to make reunion more difficult and prolonged.

Broken knee will again afford us an example. The horse that has come down with all his weight, and perhaps that of a load on his back added to it, at once cuts, bruises, and lacerates the skin and subjacent tissues. In addition, the wound may be full of road grit, some of which has insinuated itself between the injured tendons, and close to the capsular ligament, which alone may be left unbroken, and retaining the joint oil.

None of the ragged skin or hanging tendon must be cut away. There will be none too much when swelling has demonstrated how great a gap has to be filled. Wherever a lacerated wound occurs, the rags should be left to the last, and only removed when found to be dead, and a hindrance to the final healing. *New skin is in no circumstances ever produced, and every atom should be saved.*

The warm fomentations we deprecated for simple incised wounds are here most desirable. The grit and rubbish want removing, and a syringe with a little antiseptic is the best way of doing it. A two-grain to the ounce solution of permanganate of potash will be suitable for the purpose, or a weak dressing of Jeyes' fluid or Sanitas. The grit is being removed and the wound disinfected at the same time, and, though suppuration must necessarily follow an injury of this nature, antiseptic agents tend to keep down excessive formation of matter.

Despite the most suitable treatment, there will sometimes be sloughs or portions of dead tissue in a wound, and these must be detached in some way or other before it is possible for it to heal. Black oils, on a feather, inserted into a pale and inactive wound, will often excite granulation and bring about a healthy surface; but judgment and experience of its action are necessary so as not to continue with it too long, hence our preference for the agents referred to above.* The irritative fever that accompanies serious wounds is largely due to the invasion of malevolent microbes, and the use of disintectants, both to the injured parts as well as in the stable, is to be commended in all cases. Where horses are concerned it is no bad plan to give a "physic" ball, and by it anticipate the swelling of the limbs which generally follows. A pound of salts to a bullock with a serious wound is also advisable, excessive inflammation being kept in check by the judicious use of aperients in all animals.

PUNCTURED WOUNDS.

Unaided nature effects the repair of most wounds, although occupying a longer time and leaving greater blemishes than when directed and controlled by the surgeon. Both amateur and professional attendants are apt to take to themselves more than their share of the credit, but in the case of punctured wounds nature's methods are not so generally successful.

The stable prong or rusty nail or other foreign body capable of causing a punctured wound is very apt to carry in some septic matter, and the inflammatory swelling which follows imprisons it while it does its worst. The matter which results finds no adequate drainage, and pocketing follows, or, worse still, the formation of a sinus or pipe (*see* Quittor; *also* Fistulous Wither, Poll-Evil, and Pricked or Stabbed Foot).

A punctured wound should be examined with a sterilised probe, and its direction ascertained. It should be explored for foreign bodies, unless they are known to be absent. If a broken-off stake or other object is left in it

* Indolent wounds are much benefited by a solution of one part of iodide of potassium in twelve parts of water, daily.

must be got out. There are few situations in which it will not be safe to considerably enlarge the aperture for this purpose, and, taken as a broad general rule, enlargement will be good treatment, although no foreign body is suspected. Good drainage is the thing to be desired, and disinfection, as with all classes of wounds. To accomplish the latter it may be necessary in some circumstances, as when a puncture takes a downward direction, to make an artificial aperture or surgical wound, and, failing drainage by this means, a seton may be passed through to ensure it.

Some of the commonest of punctured wounds occur under the arms or thighs of horses in jumping hedges. Stakes meet here with least resistance from the thin skin, and run up into the loose areolar tissue. The movements of the limbs, and more particularly the action of the respiratory muscles of the chest, cause air to be sucked in, and serious complications follow. It is important, then, to plug these wounds as soon as the above recommendations have been carried out. A mixture of one part of turpentine and three or four of olive or linseed oil on tow will be found to exclude air better than the antiseptic wools commonly used for wounds. On ranches where a cripple can be caught up, but receive little attention, before being turned adrift to take his chance, the practice of introducing a red-hot poker and a plug of tow on turpentine, or, failing this, a piece of hard tobacco, is very often successful, and, although apparently barbarous, it is a truly antiseptic method, as far as it goes, and as long as it lasts.

POLL-EVIL.

Poll-evil is the result of bruising or injury, generally caused by blows upon the head, or the clumsy practice of lifting the heavy collar and letting it fall upon

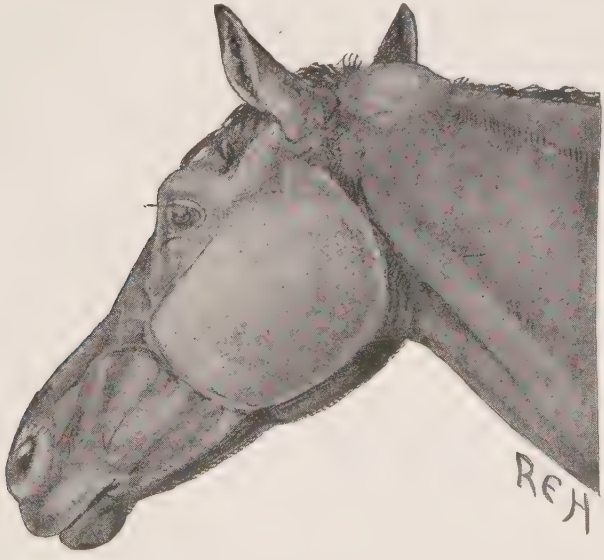


FIG 90. POLL-EVIL.

the poll, previous to pulling it over the head. It is chiefly in draught horses and among such as wear heavy collars that we meet with it. Ill-fitting bridles, with superfluous ornaments in the way of bosses, may also give rise to poll-evil.

Symptoms.—At first a little tenderness or "touchiness" about the head, followed by swelling, which may be many months before ripening into an

abscess, and during which time sinuses or pipes are being formed (*see* Fistulous Withers and Quittor). Like abscesses in any other situation, if left alone, it will point and break (*see* Abscess), but usually attracting attention, and, being opened by the lancet, continues to discharge a variable fluid mixed with pus and granules of inspissated matter.

Treatment.—This is based on the supposition that dead matter, or tissue so injured as to be incapable of repair, remains within the area of injury. Nature's plan of forming a drain pipe or sinus, from which undesirable material shall be cast out, is too slow, if ever effectual, and our business is to slough out the effete material and destroy the sinuses, getting rid (from a larger orifice) of a slough, and leaving behind a wound which will heal by granulation. The scientific plan of procedure is to secure the animal by casting and chloroform, and then with probes to ascertain the direction and extent of the sinuses, to lay them open with a bistoury, syringe out the wound, and expect it to heal up. There are men to be found in most of the counties of England who undertake to cure poll-evil for a given sum—usually thirty shillings—and they do it by methods the veterinary surgeon would fear to use. They push into the wound plugs of arsenic, of corrosive sublimate, of copper, and vitriol, in such quantities as to ensure destruction of the morbid tissues, and take their chance of injuring the spinal cord, which at this part appears to be in great danger. "Nothing succeeds like success," it is said, and for these methods we can say that we have seen many horses cured, but never even heard of one being killed by a practice which looks so very risky. Poll-evil is very apt to recur, and, we know, must do, so long as any portion of injured bone or dead tissue remains.

BROKEN BONES, FRACTURES.

Broken bones among horses and cattle are commonly believed to be hopeless and incurable, it being a firm belief of the non-professional mind that the bones will not unite, as they do in men and small animals. The same reparative process takes place in all animals if opportunity is afforded. The reason why veterinary surgeons usually recommend destroying a horse or bullock with a broken limb is an economic one; it will not pay to sling a horse or cow for months, and perhaps have a lame animal left at last.

A man may be lame yet deem himself fortunate to be able to walk again after a bad fracture, a dog will do fairly well on three legs, but we want a horse to be sound as before the accident, or he will not be worth the expenditure of time and money. A bullock will need to be in slings so long, and his digestive system thereby become so disordered that he will waste to knacker value. After making allowance for the above, there remain valuable brood mares and pedigree cows, very young colts, calves, ewes, and lambs, which may be worth treatment.

Fractures are generally distinguished from dislocations by the elongation of the limb in the former and the shortening of it in the latter, but fractures into joints present complications which are not included in this general rule.

Compound or comminuted fractures, or those in which a wound permits a broken bone to protrude, will seldom be worth treatment. If it is decided to attempt the treatment of a fracture in any animal, the first thing to be done is to get it under control (*see* Methods of Control, Anæsthesia, etc.).

The essential conditions for successful repair consist in bringing the broken ends into apposition, and there retaining them. Before any great swelling has taken place, it is usually easy to feel the bone and determine the extent of the fracture, and make the ends meet. In the case of large animals, with violent muscular contractions, we may have to administer an anæsthetic; or,

with small ones, use a degree of force in extending the limb. Some support is required, and splints are composed of many different materials. With the larger animals, wooden splints are preferred, as being easily obtainable and fairly strong. Plates of metal, as iron, zinc, tin, and various alloys, are also used. If the light wrapping of cotton wool or tow can be placed around the injured member, or a bandage, before putting on the splint, the skin will be less likely to suffer during its retention. An equable pressure below the splint should be brought about by bandaging, or swelling follows, which is not always easy to deal with. A colt or calf can be bandaged from the hoof upwards, and a pig or dog from the extremity of the toes. Sheep are very good subjects for bone-setting, and most shepherds are successful with a piece of rag and some tarred cord; but they have a woolly surface already in their favour, and, provided they get the broken ends in apposition and the splint properly set, seldom have any trouble with skin rubs and wounds,

FIG. 91. SPLINTING A SHEEP'S LEG.

such as too often follow the amateur's efforts upon other animals. Useful splints for small animals may be made out of cardboard, corrugated packing paper, ordinary brown paper, felt, and other things, first soaked in hot water and then moulded on to the limb, or placed upon it dry, but previously cut and fitted. Paper splints answer admirably, after the first three weeks, when it is desired to lighten the limb and ascertain what is making the animal fidgety. Dogs, cats, and pigs will often bear with a splint for a week or two, but begin to bite it when the skin underneath itches. It should be removed and replaced with some lighter material as above, for by that time the animal has learned to take care of the injured member, and a soft union has formed, which will eventually become hard and establish a sound bond. Any old garment torn into convenient lengths, and dipped in thin glue or in thick starch will serve as a tolerably strong splint, on the top of folded paper, if the animal is restrained until it has set. In this connection one may well recommend every young farmer to attend the lectures of the St John Ambulance Society, for he will learn much that can be usefully applied to his stock, if haply never needing the knowledge for himself or friends.

Veterinary lectures which include first-aid are now generally given under the auspices of County Councils, and should be eagerly availed of by animal owners and all who have their care.

Chapter XVI.

BLEEDING.

Bleeding in veterinary practice has fallen into disuse, save in a few cases, and among those practitioners who cling to old customs. Its merits or demerits will not be discussed here, except to remark that the abuse of any good thing is commonly followed by neglect to use it well and wisely. In the pages of this work will be found references to bleeding, and in some states of disease it is advised. The non-professional reader will naturally ask how, if he has not seen it done.

Bleeding for medical reasons is either local or general, and accomplished by opening a vein, or making a number of small punctures with an instrument. An example of local bleeding may be taken from that of an inflamed eye, where great swelling and pressure occur. It may be deemed desirable to open the angular vein, which will be seen standing out a little way from the outer corner. Remembering that veins always flow to the heart and not from it (as do arteries), a little finger pressure upon it will cause it to swell up between the finger and the eye, when it will be easy to plunge the point of a sharp clean lance into it, and allow the blood to flow, while continuing the pressure of the finger. When the latter is withdrawn, the blood will cease to flow, or only feebly. Such a small vessel will probably not require to be taken up with a pin (for the manner of which *see* Bleeding from the Jugular Vein).

Congested gums, lampas so called, or œdematous sheath, or swelling after castration in colts, will afford us sufficient examples of local bleeding by punctures. Here we seek no vessels to open, but scarify or prick in several places, allowing the blood or serosity, as the case may be, to exude at many places, and in the aggregate amount to relieve the tension for which the operation was prescribed.

General or systematic bleeding used to be an accomplishment of many persons who owned or had charge of horses or stock, but is now almost a lost art. If a horse or bullock is to be bled, say for staggers or some brain trouble, which makes it imperative to reduce the blood pressure more quickly than can be accomplished by drugs, the animal's head should be secured by one person while the intending operator presses up the jugular vein in the channel of the neck (about half-way up for convenience) until it stands out like a cord or rope. This can be done with the fingers or a big thumb, and the puncture made by a sharp, clean, broad-bladed lancet. This is the expert's mode; the layman will prefer the use of the fleam, although really not so convenient. He will prefer, too, to have the vein made full and plump by tying a cord around the animal's neck with a noose which can be drawn tight or slackened at will. A wine cork or round piece of wood, placed in the jugular furrow and under the cord, is helpful. When all is ready, the fleam is held against the vein with one hand, while the other is used to strike it with the blood stick or other short heavy weapon. Safety consists in having the vein so full as to offer resistance; if partly empty, the fleam may be deflected, and other tissues injured, without the desired result of opening the vein. When a sufficient amount of blood has been extracted, the pressure is removed, and the stream allowed to flow down as before. The skin is pinched between the finger and thumb while a pin is run through it at right angles to the wound. Around this pin a figure of eight is wound in tow or other soft material and allowed to remain until next day, when the pin is carefully withdrawn and

the tow falls off at the time or shortly after, and the wound is found healed. Very seldom was subsequent trouble experienced in the days when bleeding was carried to an absurd extent, but if now practised the part to be operated upon should be first dressed with an antiseptic, and all the materials or instruments employed similarly treated.

HÆMORRHAGE, OR BLEEDING.

The instructions given to the St. John Ambulance classes are, in the main, applicable to the lower animals, but with this difference—the man is amenable to reason, as a rule, and it is possible to carry him to a place of safety. Panic does not make him kick or bite those who would succour him. With a horse impaled upon a fence or area railing, pain and panic make him dangerous to approach, although his great weight can be overcome by the power of the lever.

The tourniquet extemporised out of a pocket handkerchief and a stick may answer well enough for the lower parts of the limbs, but when a carriage pole has gone into a horse's breast, and left a wound big enough to put one's fist into, some other means must be found.

Accidents of the latter kind are not at all rare, and we have often observed how the great strength of the arteries has saved the lives of wounded horses, the vessels standing out and their pulsations being quite visible. True, the subsequent inflammation in rare cases may cause their rupture or disorganisation, but it is quite the exception, and need not be here considered.

ACCIDENTS OCCURRING IN THE STABLE.

Accidents occurring in the stable and near to home and succour, afford opportunities for arresting hæmorrhage that place them in quite a different category from those met with in hunting, or even with agricultural horses at work. It should be remembered that every movement of the injured beast increases the danger of fatal hæmorrhage, and that the instinct of a wounded animal to separate himself from the herd and remain still is capable of scientific explanation. Indeed, we may go further, and say that fainting itself often saves the life of a man or beast, by placing him in a position most favourable to continued circulation, and the formation of a clot or plug to the divided vessels. Watch the bleeding colt or lamb after castration—two jets of blood come from the divided arteries of the cords, and as the bleeding abates two long strings of congealed blood hang down, the drips from the ends finally losing the colour of blood. This is nature's method of arresting bleeding, and if we interfere at this stage and remove the clots the hæmorrhage will immediately recur, and be with greater difficulty allayed. In this connection it may be remarked why the castrator is often heard to say that he "doesn't mind a little blood, and that the colts are less liable to swell if they bleed a bit at the time." Quite so. A long clot hangs out of the wound and presently falls off, when its purpose has been served; but the colt in which scarcely any blood has been observed to escape has a clot *inside*, which has to be absorbed or passed out subsequently by changes occurring in its composition.

ARRESTING BLEEDING.

Taking our cue from Nature, we try to supplement her efforts and save time by applying some substance, either liquid or solid, which experience has proved effectual in such cases. What are these? The tourniquet has already been alluded to as a means of arresting bleeding by means of pressure on the vessels of supply, and is suitable in the case of division of arteries or veins which it is feared will immediately result in collapse, or where it is

possible to temporarily stop the flow while getting an animal home or sending for the doctor. A pocket-handkerchief, a necktie, a shirt-sleeve, or the lining torn out of an old coat may serve in an emergency far from home or help, and where a limb has to be dealt with; but a rump or chest torn open cannot be so treated, yet the means are often at hand without being discovered. The man may have a scarf-pin, and though the horse may be "docked" as well as "hogged" he will surely have some hairs in his tail long enough to tie together. If these means exist, the skin can be drawn together at the widest part, and the strand of hair wound round the pin in figure of 8, while further appliances are being sought. Pieces of wire, hairpins, butcher's skewers, or sticks taken out of a hedgerow and sharpened with a penknife can be made to do duty, if a hole is first pricked through the skin where the extemporised needle is intended to pass.

The ox and the sheep also carry about with them some of the means of arresting hæmorrhage for those who will bear in mind our hints above given. A bunch of wool from a sheep, a handful of horsehair, a duster, towel, pocket-handkerchief, a hat-lining, or piece of rope, frayed out to resemble tow, may either of them answer the purpose of staunching a great wound and assisting nature to form a clot.

The patient at home will run less risk of having septic matter introduced nto the wound by the employment only of clean materials, but abroad we must do the best we can and use disinfectants afterwards.

Modern science has shown in what a variety of ways injurious germs gain access to the system, and it may well be supposed that cobwebs that have for years had the opportunity of collecting all that is going in the way of bacteria are not the safest things in the world to apply to an open wound, but they are certainly of value in arresting hæmorrhage. A sponge thrust into the yawning wound is a good plug, but it should be understood that everything employed in the dressing of wounds must, if possible, be rendered aseptic, or free from germs.

BLEEDING FROM THE NOSTRILS.

Much alarm is often felt at seeing blood from the nostrils of horses and, more rarely, from other animals. It may indicate a very serious state of things, or merely local congestion, as when the noses of children bleed. A trickling of bright red blood will probably come from small arterial vessels overcharged, and relieving themselves after some unusual exertion. Nothing more may be noted, or the animal may be discovered to have a slight disposition to this sort of thing and still be a healthy one. There is a very large expanse of blood-vessels spread over the membranes of the respiratory tract, and those which circulate in the nasal membrane and that covering the turbinated bones may easily suffer congestion and rupture without any grave consequences. In these cases the amount of blood is never very great, and the flow soon ceases. If a large volume of blood comes from the nostrils it may indicate the rupture of an important vessel. When from the lungs, the fluid is mixed with air bubbles and is frothy and high-coloured; if from some other part, it will be darker in colour, and the air bubbles and spume will be absent. A rush of blood from the mouth may generally be assumed to come from the stomach, but it is not seldom emitted through the nostrils as well, through the communication at the back of the palate (posterior nares).

Treatment.—Cold water thrown over the head. A pledget of cotton wool or tow pushed up the nostril and retained by the hand for a short time. Syringing up the nostril with a solution of one drachm to the ounce of tannic

acid in water. Drachm doses of gallic acid dissolved in glycerine and water, and given as a drench, or half-drachm doses of sugar of lead dissolved in three or four ounces of water (*see also* Notes on Hæmorrhage).

WHILE WAITING FOR THE VET.

Horses and cattle sometimes bleed to death while waiting for the vet., and the means above suggested fail to accomplish their purpose because some large vessel is, from its situation, kept open, and nature fails to form a plug. With proper instruments the surgeon can secure the artery and twist it, or leave a " bull-dog " forceps upon it.

The amateur cannot be expected to be in possession of such appliances, and, failing professional assistance, had better make the poker red hot and apply to the mouth of the spurting vessel again and again, when his perseverance will be soon rewarded, and he need have no fear of the lost structure by burning. Living tissues are most difficult to destroy by the hot iron, as anyone may know who has seen the futile attempts at burning away the growths on an old greasy heel. It will be understood that every means should be tried before resorting to the hot iron, because the healing process may be retarded, although from an antiseptic point of view the iron is perfect, hence the usual good recoveries from castrating with the old-fashioned clams and red-hot firing iron.

There are many styptic agents employed by the surgeon, but we do not propose to enumerate them here. Our remarks are but hints for emergencies. Cold water has in many sorts of hæmorrhage a very beneficial effect; it reduces the calibre of the vessels, and ice or snow are still more styptic, as it is the result of cold, and not any virtue in water, that acts as an astringent on the blood supply to a part; the coldest obtainable should therefore be used.

It is important that the reader should understand we do not advise water as an application to wounds in the genera way, but in this particular connection, as a means of stopping excessive bleeding.

Chapter XVII.

OPERATIONS.

These as a rule should be left to the veterinary surgeon, but must be undertaken by the stock-owner at times, if he would save the life of an animal while waiting, or when unable to obtain expert aid.

CASTRATION.

Many handy men who have had no veterinary training are nevertheless successful castrators, and the late Professor Simonds, when Principal of the Royal Veterinary College, used to say that their rough and ready methods were attended with as large a measure of success as the more refined practices of the qualified man. Be that as it may, many stock-raisers require to do such operations themselves, and a few hints on the subject will not be out of place here.

CASTRATING PIGS.

Pigs and lambs being of less value than some other young stock, most men will begin on these. The most convenient method of holding a pig for castration is to take him by the hind legs, and, with his back to the helper's body, swing his head between the man's legs and close them round his neck, while bending each hock in his right and left hand respectively, and about four inches apart, to permit of the operator standing in front and squeezing up the testicles so that the skin shall be tightly stretched over them. With finger and thumb of left hand he retains them in position while making a bold incision with the knife which he is holding in his right, One bold slash causes less pain than two incisions, and no harm is done if the wound penetrates the testicle. This is squeezed through the opening and drawn out, cutting the attachment to the scrotum first and the cord with its blood vessels last. The process is repeated with the other organ, and the pig liberated. In the case of broken or ruptured pigs a smaller incision should be made, and as high up as possible, and both testicles taken through the same opening, then a stitch or two put in.

LAMBS.

These are best secured by the attendant grasping a front and hind foot in each hand while he holds the back of the animal against his own chest, and the operator takes up a position somewhat to the left of the lamb. The purse is seized and extended and about an inch of it cut off. The testicles are in turn squeezed into view and taken in the operator's teeth, and drawn out by a slow backward movement, which breaks the artery in the way least likely to lead to hæmorrhage. This is the plan adopted among those who operate very early and dock at the same time. A leather cutter's shear steel knife with a rough edge obtained by sharpening on a scythe rubber is the best instrument for the purpose; not a smooth sharp knife.

Older lambs require more precautions. A portion of the purse should be cut off, but the cords should be placed in clamps previously dressed with the castrator's green ointment (which see) and divided by the hot iron, which should be of a dull red heat that will not cut like a knife but cause the artery to contract by its influence. Before loosing the lamb, the edges, both inside and out, of the purse should be anointed with the antiseptic ointment above mentioned. The chief dangers connected with the castration of lambs

are those of subsequent bleeding and of clotting inside the purse. The latter is the cause of death by blood-poisoning; hence the practice of taking off the end of the scrotum.

CALVES.

Castrators have different ways of casting, but any plan by which the organs can be got at will succeed. The testicles are very soft in young ones, and the purse should be held in such a manner as to tighten out the folds of the skin (*see* cutting pigs), and a clean knife with very keen edge employed, with a long sweeping cut that will not wound the testicle. A second application of the knife to the then investing membrane may be necessary before the organ is fully liberated, when it should be pulled out and the portion attached to the purse first divided; then the cord may be pulled out and twisted many times and scraped through with the heel or blunt part of the knife; or the cord may be placed in clamps and divided by the iron in the same way as advised for big lambs. The green ointment is advised, and for the same reasons as for lambs (which see).

COLTS.

The greater value of colts is a reason for employing the professional man even through the stockman may be in the habit of successfully operating on pigs and lambs, and perhaps calves.

The principles above inculcated are just those to be borne in mind in emasculating colts, but there is a little more knack required in casting with ropes. The scrotum should be grasped firmly, the long sweeping bold incision made, and the resistance of the cremaster muscle overcome by continuous traction upon the organ when once grasped. More time should be allowed for sealing up the artery of the cord in colts than is necessary for bulls. In the case of donkeys and mules, it is perhaps better to ligature the vessel with fine twine previously soaked in a disinfectant, as the artery is so rigid it will often burn away rather than contract and form the required plug, but ligaturing is not advised for horses, although so clean and scientific a method, because tetanus more often follows on its employment. The green ointment should be freely used on the clamps as well as upon the wounds before allowing the animal to rise. The ecraseur or crushing method of castration is now very largely adopted. *See* illustrations.

SCROTAL HERNIA OR RUPTURED PURSE.

What are called "broken" pigs have been referred to in connection with their castration. In the case of colts no one but a veterinary surgeon with an intimate knowledge of anatomy should attempt operation. The method adopted is to open the outer coverings and enclose the inner one together with the spermatic cords in a clam that will by pressure cut off the blood supply, as is done in the ram—so-called trapping. While the testicles are sloughing away an adhesive inflammation is going on the other side of the clam, and eventually seals the orifice from which the knuckle of intestine escaped. This is called the covered operation. Colts with this defect should not be kept for stud.

The recipe for castrator's ointment so universally used is as follows:—

Castrator's Green Ointment.

Verdigris	1 oz.
Venice turpentine	3 ,,
Lard	10 ,,

Melt the turpentine and lard together at a low heat; stir in the verdigris, until cold.

CAUSTIC CLAM CASTRATION.

This is performed by first liberating the testicles in the manner previously described and then by applying wooden or metal clams dressed with some destructive substance. The following is a well-proved one :—

Perchloride of mercury - - - - -	2 drachms.
Red precipitate powder - - - - -	2 drachms.
Powdered gum arabic - - - - - -	6 drachms.

BLEEDING AFTER CASTRATION.

When a colt breaks out bleeding after the castrator has gone, it is generally a long time before he can be summoned, and this is the time for the intelligent

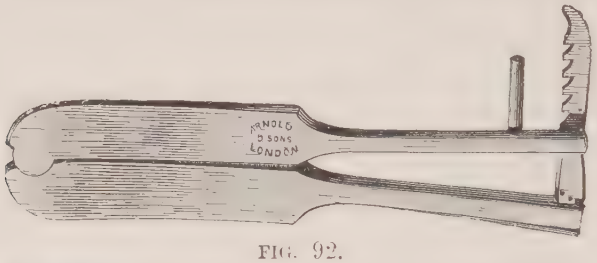


FIG. 92.

FIG. 93.

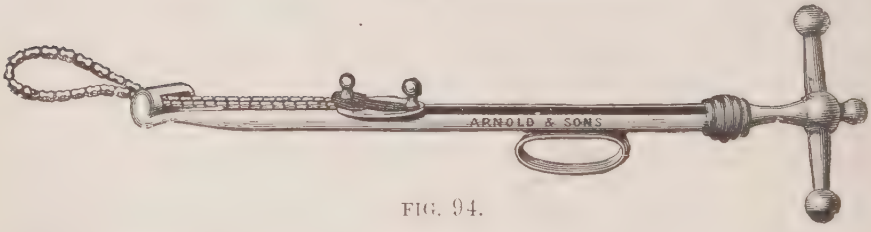


FIG. 94.

farmer to take upon himself a work that will in all probability well repay him for his temerity.

The animal should be secured, and a few buckets of cold water thrown over his loins and dashed against his belly, the flow of blood being carefully noted meanwhile, as it may very well be that the shock of the cold water is all that is required to stop the blood. If these means do not soon succeed, the colt should be cast with as little struggling as possible, and turned in a three-quarter position, but not on his back. A finger should be introduced to feel if the severed cord is within reach, and if it is the man should retain it until a slip-knot can be passed over his hand and the cord secured, with just enough pressure to arrest the flow of blood, leaving out long ends for the vet. to do what he thinks best with when he can be got.

If, as is generally the case, the spermatic cord cannot be felt, a plug of tow dipped in tincture of iron, tannic or gallic acid, or any other astringent obtainable from the nearest doctor or chemist, should be packed rather tightly into the wound. A few stitches may be made through the purse, allowing

plenty of margin. One or two may be put in before stuffing in the plug, the novice generally finding it very difficult to get anything to stop in. The advice tendered here is only as first aid. A veterinary surgeon should be most certainly obtained as early as possible, and the case handed over to him before blood-poisoning sets in from the retained and more or less decomposed blood, which is a necessity in the circumstances.

Colonials accustomed to take risks, and compelled to rely upon themselves in such matters, are advised to wait till next day, and then cautiously remove the plug and syringe with some weak carbolic or other favourite disinfectant, clearing away all clots and decomposing matter very gently for fear of setting up bleeding again. A liberal dressing should be applied outside to keep off flies and prevent the introduction of disease germs.

Wounds of this and, indeed, of any other kind always do better out of doors unless the fly season is fully on and efficient dressing cannot be procured for the patient.

On a ranch, where the animal will not be seen again for a week or two, the best thing to do will be to smother the parts with tar and hope for the best.

DOCKING HORSES.

So long as fashion demands a short dock, breeders will have to comply with it. The best age to dock is while a colt is quite young. The operation is less painful, and the stump rounds off into a better shape when healed and cicatrised. Some breeders dock them at the time of castration, but this is rather a severe practice, and a later date will do as well.

The Royal Society for Prevention of Cruelty to Animals has conducted many prosecutions against persons for docking horses, and some convictions have been obtained. As a rule the veterinary surgeon, performing the operation with care and skill, escapes a fine, while the amateur is generally mulcted more or less severely, according to the degree of knowledge or prejudice of the Bench.

The division should take place between two of the tail bones if they can be felt, and the wound sealed by a hot iron and powdered resin, or ligatured above sufficiently tight to prevent hæmorrhage. The stump should be covered with tow soaked in carbolised oil, and bound on. The next day it may be removed, as well as the ligature, and healing usually follows. If a piece of bone is left, it is well to remove it, or the sore will remain for a long time.

Chapter XVIII.

BLISTERS, BLISTERING AND FIRING.

Blistering and firing are very ancient practices, and it is to be regretted that modern science has found no efficient substitutes. We have the satisfaction of being able to perform the latter operation under the influence of anæsthetics, but acute and continued suffering follows. The results justify the practice.

FIG. 95. SETON NEEDLE (*Huish*).

Blisters are applied for a variety of objects, and their *modus operandi* is supposed to be one in which a deep-seated inflammation is drawn to the surface and got rid of; a sort of casting out of devils by Beelzebub, in which some modern practitioners have lost faith, without, it is to be feared, discovering a more excellent way. Whether this is the true explanation or not, the good results of blistering are beyond question. Proof we have in abundance of the second form in which blistering benefits a previously inflamed and weakened joint tendon or ligament, in the thickening of the skin and support derived from it as a permanent bandage.

Firing is undertaken for the same reasons—only "more so." While blistering thickens the skin, it leaves some of its elasticity; firing in lines or diamonds has yet another effect; it binds more tightly, because true skin is never reproduced and the fibrous substitute is devoid of elasticity.

Blistering or firing, or both, are undertaken for many purposes besides the cure of sprains or strains of joints, ligaments and tendons; it is done to arrest the growth of bony deposits and to effect their removal by exciting the absorbents to carry them away. Hence it is that sidebones, ringbones, spavins, splints, and other bony deposits or ossific growths are blistered or fired, or both.

There are a number of substances employed as blisters, the chief of which are biniodide of mercury, Spanish fly (cantharides), mylabris, euphorbium, turpentine and mustard. The first and last named would serve every purpose, and the author would take the opportunity here of warning farmers against purchasing violent compounds of oil of vitriol and corrosive sublimate, sold under fancy names. They are apt to cause sloughing of the skin and permanent blemishes, and do not have any more effect in removing bony deposits than biniodide blisters in safe proportion.

Blisters made of cantharides are commonly called "fly" blisters and are suitable for sprains or strains of soft parts, while biniodide is more lasting in provoking absorption, and therefore chosen for bony growths or joint troubles. To the fly there is the objection that it is not so certain in action, and that it is occasionally absorbed into the system and produces disturbance in the urino-genital organs. It may not therefore be recommended for use on a pregnant mare or upon the loins of any horse.

There are many degrees of sensibility in the skins of animals; the thin-skinned thoroughbred will need a milder application than the thick-skinned hairy-legged Shire horse, and one should not adopt a single blister for every purpose, although a pot of biniodide of mercury will be all that one need keep, since it can be made of any less strength by mixing the required amount with any proportion of lard or vaseline. A stock pot of blister should be of the strength of one part in eight; this is as strong as anyone ought to use without special instructions from a veterinary surgeon. Some practitioners will use it in the proportion of one in seven for a very thick-legged animal, but the writer thinks he has seen much better results from a second application of the milder preparation, without entertaining the risk of sloughing. If a quarter ounce of lard is added to one ounce of this stock blister, the strength will be one in ten, and if half an ounce it will be one in twelve, and so on.

I should say for splints, spavins, sidebones, and ringbones, use the one in eight, and for general purposes one in ten. If it is intended to apply several blisters, and allow a long time for the absorption of some deposit, then one in twelve or even one in sixteen will do, at intervals of a month or less. Turpentine blisters horses much more readily than cattle, pigs, or dogs, and is not to be recommended for horses, since individuals are so excited by its application that they are almost unmanageable. With two or three parts of linseed or sweet oil, turpentine makes a good counter-irritant for cattle, for application to the chest walls in cases of lung trouble, and where mustard and vinegar would be best suited to horses. With oil and ammonia turpentine makes a popular liniment for sprains, and is known as white oils (*see* recipes for the preparation of such oils in chapter on Medicines).

Mustard is an excellent vesicant or mild blister for sore throats and chest colds, pneumonia, pleurisy, &c. (*see* Diseases of the Respiratory Organs). It is used as a counter-irritant in colic and inflammation of the bowels, as safe and quick in its action. Boiling water should never be used in mixing mustard, as it weakens rather than fortifies it, and cold water answers just as well as warm, while enabling the mixer to keep his eyes open longer when applying it to the patient. It should be of about the same consistence as that prepared for the table, when it will be found to spread and rub in readily without much loss. Clipping the hair off the parts facilitates the action of a blister, but is not essential.

Precautions.—Special care should be taken to prevent blistered animals from injuring themselves while smarting under the effects thereof. If a horse's throat is to be dressed with mustard he should be turned round in the stall and secured by a pillar rein on either side or racked up above his manger in such a manner that he may not rub the throat. If a front leg is to be treated, he should be put on the pillar reins to prevent striking against the manger. To prevent the opposite leg being rubbed a bandage should be put on. This remark applies also to hind limbs. Temperaments differ so much in animals that one horse will merely paw and show uneasiness with a blister of the same strength which will make another one mad with pain and anger. The morning should be chosen for applying blisters, and the patient should not be left for long together during the most active stage; the voice of the groom will soothe the nervous and excited and restrain the violent. The acute pain will have passed off before the attendant's bedtime, and the patient be less likely to break away or get into trouble. Two halters, one of which is put on left-handed, and both knotted to prevent drawing tight, may be recommended where there is a shortness of stable appliances. We have known some horses so violent when blistered that it was necessary to fasten them by a ring on the nose-band with a rope or chain to a ring in a

cross beam of a barn or other building where it was not possible to strike or rub against any object.

Firing should never be undertaken by anyone but a veterinary surgeon; it requires practice upon dead legs to learn how much pressure and what heat may be employed without going too deep or failing to obtain the desired effect. Blistering on the top of a fired leg is, to say the least of it, very severe upon the animal, but many people deem it necessary. It is also a fact that fired legs are finer in the end for exercise taken at the time when serum exudes from the fissures made by the iron; that is to say, within a few days of the operation.

Line firing is most general; diamond or cross firing makes a tighter permanent bandage, and feathering looks best. Puncture firing with instruments made for the purpose is sometimes practised for bony deposits such as spavin, ringbone, &c. (*see* Treatment of Spavin).

After firing or blistering, our sympathy for the patient makes us anxious to relieve him by the application of oil or lard, vaseline, or some other emollient, but it is doubtful if the absorption desired is not better effected by leaving on the hard scabs which exert a pressure upon the parts beneath. The heels and other parts not intended to be included in the action of a blister should be guarded by a dressing of lard or spermaceti ointment.

CHARGES AND BLISTER CHARGES.

Charges are substances in the nature of plasters and intended to keep up their effects for a long time. They are prescribed for enlargements and sprains, as, for example, in the dropsical condition of the hock joint of young horses, known as bog spavin and thoroughpin, or for sprains of the loin and other muscles. By their firmness and solidity they exert a continuous pressure over a weak part. Sometimes a small quantity of vesicating material is added to make them more active. They are then known as blister charges.

The basis of them is pitch and wax or resin, and the usual vesicant a small quantity of cantharides. They are applied warm enough to be spread, but not hot enough to scald the skin, and the person using them should oil his hands and implements, or they stick to everything but the part where wanted. Clipping the hair off is not necessary as a preliminary to putting on a charge, nor in the case of blisters, but the latter act more quickly and less blister is required. Chopped tow or wool is spread upon the surface of the plaster or charge while warm, to prevent a collection of brambles and leaves, which will otherwise adhere to the plaster and annoy the patient.

The following recipes have long found favour:—

Simple Charges.

Pitch	4 ounces.
Venice turpentine	1 ounce.

—Gasparin.

For Strains of the Loins.

Pitch	4 lbs.
Venice turpentine	6 ounces
Olive oil	4 „

Melt together.—Bracy Clark.

Blister Charges.

Burgundy pitch	5 ounces.
Yellow resin	1 ounce.
Venice turpentine	3 ounces.

Melt at a low heat and stir.

Burgundy or common pitch - - - -	5 ounces.
Tar - - - - - - - - -	6 „
Wax - - - - - - - - -	1 ounce

Melt together, and when they are becoming cool stir in half a drachm of powdered cantharides.—Youatt.

Cold Charges for Sprains of the back Tendons.

Bole ½ lb., white of egg and vinegar to form a soft paste, to be applied on cloth or leather and removed as it dries.—Bracken.

Mercurial Charge.

Burgundy pitch - - - - - -	1½ ounces.
Wax - - - - - - - -	1½ lbs.

Melt and add while cooling 9 ounces of mercurial ointment previously mixed with 6 drachms of iodine.

These are applicable to horses, cattle, or sheep. Dogs usually gnaw them off, and other means must be employed (*see* Methods of Restraint).

SETONS, SETONING AND ROWELLING.

The practice of setoning is less resorted to than formerly, although still of much service in poll-evil, fistulous withers, and other cases.

Setons may consist of any material, as tape, string, cord, twisted horse hair, or leather. They are inserted by means of needles made for the purpose, and of various sizes, but the principle is the same whatever the size or material of which a seton is composed. It is usual to dress them with some irritant, as turpentine, white oils, chloride of zinc, sulphate of copper, arsenic, or other substances destructive of tissue, or provocative of pus formation. Reference to the subject of poll-evil or to fistulous withers, will explain one of the chief uses of setons. They are also employed to provoke issues. In districts subject to quarter-ill or black leg they are put through the dewlap, under the impression that a formation of matter (in a place so harmless) will divert or prevent the advent of disease elsewhere. Setoning against black leg is more scientific than it looks, as it excites the antitoxins or natural guards in the blood whose duty it is to call up the phagocytes to repel invaders in the form of disease germs. Their method is to squeeze up against them and absorb them, a process that can be seen under a high-power microscope.

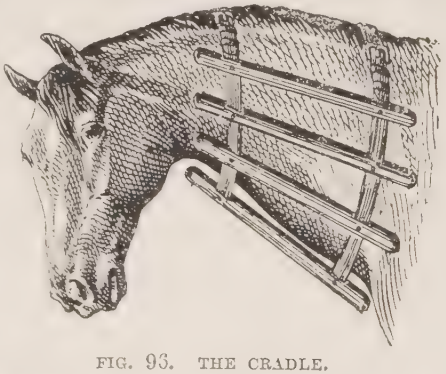


FIG. 93. THE CRADLE.

Rowels are round pieces of leather or other lasting material with a central hole cut in them. They are placed under the skin, after an incision has been made and the connective tissue under it broken away, to give enough room. They are dressed with irritants in the same way as setons, and are expected to drain through the central hole above referred to. Setons give so much better drainage, and are so much easier to insert, that they have quite displaced rowels, which are now rarely seen.

Chapter XIX.

POISONS AND ANTIDOTES.

Few men take the trouble to make themselves acquainted with the symptoms of poisoning and the best things to counteract them while waiting for professional assistance. This is much to be regretted, as valuable time is lost, or the wrong thing given. In the excitement which follows accidental poisoning, the lay reader is not in a condition to rapidly assimilate information derivable from books, and looks at the wrong place for the knowledge he so urgently requires. If such a worried one has read the above, he will wish the writer had come to the point at once—his point—but our point is to try and induce him to read this chapter carefully, on one of the many dull evenings in winter when reading may be made profitable.

POISONS.

What is a poison? As a popular acceptation of the term, Finlay Dunn says: "A drug, whether animal, vegetable, or mineral, which, in small quantity, destroys health and life; but it differs from a medicine only in the degree or intensity of its effects." Medicines, then, may be given in such doses as to prove poisonous, and poisons may be so prescribed as to be valuable medicines.

ANTIDOTES.

Antidotes are agents which counteract the effects of poisons in various ways. They may act in neutralising chemicals—converting acids, for instance, into harmless neutral salts; they may mechanically envelop some irritant poison, as when oils and gums in solution are given to protect the membranes from the effects of substances already swallowed. Such excessively dangerous poisons as corrosive sublimate, and other metallic salts, will form insoluble albuminates, to be presently got rid of in other ways, if whites of eggs or other forms of albumen are promptly administered. By a chemical change, soluble arseni- is rendered inert if freshly precipitated ferric oxide is given. Nor are antidotes confined to liquids and internal remedies. We may rouse the sinking animal with ammonia gas, reduce the spasm of strychnine poisoning by the inhalation of chloroform, ligature the snake-bitten limb, or cauterise the bite of a rabid animal to prevent or hinder absorption. When a poison has been already taken into the system, and is in course of producing its effects, we may in some instances introduce a physiological antidote by the stomach, the lungs, or hypodermically with suitable instruments. A tobacco-poisoned animal may be saved perhaps by timely administration of strychnia, and the strychnia-poisoned by tobacco. These are remedies which antagonise the lethal tendencies of their opposites. The deadly slowing down of the heart and muscles which control respiration, when a poisonous dose of aconite has been taken, may be counteracted by alcoholic stimulants.

Liquid poisons such as carbonic and other acids which pass rapidly into the circulation, or have their deadly effects upon the tissues with which they come in contact, must be speedily neutralised, but such as take time to act may be ejected from the body by some of its "natural gates and alleys." Salts of lead, copper, mercury, and others may, in animals with single stomachs, be vomited; and swine, dogs, and cats will receive an emetic while other measures are being prepared. The horse is rarely capable of vomition,

and the act is regarded as indicative of some fatal rupture (*see* Ruptured Stomach, &c.). Emetics, then, are not advised for horses, and are useless with ruminants. The stomach pump will be of use only in the hands of the veterinary surgeon. The stock-owner will not possess one. Perhaps the best service we can render him here is to give a list of poisons of the kind from which animals most often suffer, and their antidotes, referring the reader to the posological table for quantities.

ACORN POISONING.

The fruit of the oak, which in former generations afforded employment to children and food for pigs, is now more often a scourge than a blessing to the master of beeves. The labour of gathering, under modern conditions, costs more than the acorns are worth, and thus it happens that in a prolific year cattle eat too many, and suffer from a form of indigestion which not infrequently proves fatal, or so sickens a beast that any prospect of ultimate profit on his feeding is out of the question. Cows become unprofitable and sometimes abort; they more frequently obtain attention in time, owing to the sudden diminution in the milk yield. Young animals suffer more severely than the mature.

Symptoms.—These are not easily distinguished from impaction of the omasum, or "fardel bound," until the disease has made some progress. The affected animal deserts his fellows, or if without company does not come to the call of his usual attendant; is dull and depressed, as shown by hanging head and drooping ears; there is a disposition to a gummy discharge about the nostrils. Obstinate constipation is present, and appears to be due rather to a paralysed condition of the canal than to accumulations of hardened material. The dung is found to contain the broken coverings of acorns, but the solid portions are rarely seen. A staggering gait indicates the poisonous influence upon the brain and spinal cord, and delirium may occur before death, although a comatose condition is the more general.

Some of the outbreaks of the last century were investigated by the professors of the Royal Veterinary College in London, more especially with a view to finding out the nature of the poison; but no special toxic agent was discovered, and post-mortem examinations showed no lesions other than those which might be expected from excessive quantities of tannic acid in the blood. It was already known that tannin was the astringent principle of acorns, as of the bark of the oak tree, and the distortion of the red corpuscles of the blood corresponded to that noted in tannic acid poisoning.

Treatment, unless at an early stage, is of comparatively little value, no remedies availing when the wasting period has been reached. Strong purgatives, as aloes and salts, combined with an ounce or more of bicarbonate of potash or soda, may be advised when the trouble is first diagnosed, and one should not be deceived by a false diarrhœa, which in this malady, as in fardel-bound, indicates only the fermentation of alimentary matters finding vent by means of a thin lane running through a bowel often packed with hardened material.

To restore the power of digestion and give tone to the stomach and intestines, a course of nux vomica and soda, with gentian or calumba, may be recommended (*see* Table of Doses).

Preventive measures consist in collecting acorns, especially in the early autumn; the unripe or immature fruit first found upon the ground having apparently more of the objectionable principle than the later fruit. This latter statement is a matter of experience; there is no scientific demonstration possible, but there are analogous cases to be found in yew and other vegetable poisonings (*see* Yew Poisoning).

YEW POISONING.

Our knowledge of poisoning by yew has made but little advance since its pernicious effects were first observed. There can be no doubt that animals often browse upon it without the slightest injury, and that at other times a very few young shoots prove fatal. Post-mortem examination has shown but a small quantity of the plant, while cattle and horses have been often seen to eat very much more with impunity. It has been thought by some observers that the half-dried condition—as when loppings or hedge trimmings are left upon the ground—is the state in which the poison is most active, and there is some reason for supposing this, if the case of other plants is to serve us. The leaves of mangel left in fermenting heaps, and fed in this condition, poison with oxalate of potash, which is generated by some decomposition from pre-existing elements; and so it may be with the foliage of the yew tree; but we have abundant evidence of death resulting from nibbling the shoots from the living shrubs, as well as from loppings, fresh and withered.

Like most of the vegetable poisons which animals sometimes eat, it is a powerful narcotic, producing paralysis of the nerve centres and coma. Unfortunately, the cause is seldom recognised until the animals are found dead or dying, and yew trees continue to be planted in a country so rich in evergreen trees as to be easily able to spare this beautiful but deadly ornament to the churchyard and park. The original use for archery passed away five hundred years ago, and many thousands of cattle must have since perished, yet we are so conservative or else selfish as to continue to grow a plant so dangerous.

Treatment.—Where one animal has been found dead or suffering from yew poisoning, it may be assumed that others have already partaken of the forbidden tree, and they should be promptly drenched with diffusible stimulants, brandy, whisky, or other alcoholics, or with ammonia, and a bold dose of linseed oil, which will serve to mask the poison and carry away the remaining portions of the plant without digestion. It has been observed that the treatment accorded to persons suffering from over-doses of opium is beneficial, and that keeping the beasts moving prevents them yielding to the fatal lethargy which would otherwise set in. If they can be stimulated to exertion, and the heart kept going by internal administration of heart excitants for a certain time, recovery is probable.

Prevention should be the care of stock-owners, and tenants of land overhung by yews should notify landlords and neighbours of the danger, and arrange for the immediate removal of cuttings, if they cannot induce owners to do away with a perpetual menace to the safety of stock.

POISONS.	ANTIDOTES.
Ammonia gas - - - -	Vinegar vapour; scatter chloride of lime in apartment if gas remains.
Carbon monoxide (charcoal fumes)	Fresh air, artificial respiration.
Coal gas; Marsh gas - - -	Artificial respiration, hot and cold water alternately thrown over head and neck.
Mineral acids, as oil of vitriol (sulphuric acid), aquafortis (nitric acid), spirit of salts (hydrochloric acid), phosphoric acid.	Antacids, as bicarbonates of soda, potash, and magnesia, chalk, whiting plaster off the walls, soap, milk, whites of eggs, olive, linseed, or almond oils.
Acetic acid, oxalic acid, salts of lemon (superoxalate of potash), tartaric acid.	Carbonates of magnesia or lime, chalk or wall wash.

POISONS.	ANTIDOTES
Prussic acid (hydrocyanic acid), cyanide of potassium.	Hot and cold water alternately dashed over the spine; ether camphor, atropine hypodermically injected; sulphate of iron, perchloride of iron, magnesia.
Caustic potash or soda, liquid ammonia.	Dilute vinegar, lime-juice, any dilute acids, milk whisked with eggs, milk alone, salad or linseed oils, stimulants if collapsed.
Aconite (monkshood) - - -	Ammonia, alcoholic stimulants, atropine, digitalis, warmth.
Acorns, ferns, oak shoots - -	Linseed oil, saline purgatives, laxative foods.
Alcohol - - - - -	Strong coffee or tea, cold water to the head, ammonia, ether camphor.
Anæsthetics—chloroform, ether, &c.	Cold affusions to the head, ammonia to inspire, artificial respiration.
Antimony - - - - - -	In animals which vomit, antimony relieves itself. Others should have stomach washed out with tannin or gallic acid in solution and followed by such demulcents as milk, white of egg, mucilage of acacia, tragacanth, and bismuth.
Arsenic - - - - - -	Every effort should be made to wash out stomach with syphon and warm water, freshly precipitated ferric chloride should be given, and, in the case of dogs, pigs, and cats, emetics of sulphate of zinc. Demulcents afterwards, as milk, eggs, oils.
Belladonna, hemlock, henbane -	Strong coffee, alcoholic stimulants, moving about, electric currents, artificial respiration.
Cantharides (Spanish fly) - -	Demulcents, as barley water and gruel, but not oils, as they are solvents of the active principle of the fly.
Carbolic acid, creosote - - -	Sulphates of sodium and lime, saccharated lime, stimulants.
Croton oil - - - - -	Barley water and gruel, stimulants.
Chloral - - - - -	Move patient about, give stimulants strychnine, and coffee, friction to extremities, clothe and bandage.
Cocaine - - - - - -	Chloral, chloroform inhalation.
Colchicum - - - - -	Tannic and gallic acids, stimulants, demulcents.
Insect stings - - - -	Ammonia and oil locally, dilute carbolic acid.
Laburnum - - - -	Stimulants and coffee.
Leads (salts of) - - - -	Dilute sulphuric acid, Epsom salts, sulphate of soda, iodide of potassium, castor oil at intervals.

POISONS.	ANTIDOTES.
Copper	Wash out stomach, give large quantities of whites of eggs and milk, soap, magnesia, treacle demulcents, iron-peroxide (moist).
Mercury	Olive oil, iodide of potassium.
Morphine and other products of opium and narcotics generally.	Empty stomach by pump of vomition, give hot coffee, ammoniacal and alcoholic stimulants, electric shocks, strychnine or atropine hypodermically, keep patient awake by compulsory movement, artificial respiration.
Phosphorus	Emetics, charcoal, sulphate of copper, turpentine; nothing fatty.
Quinine	Stimulants, coffee, tannic and gallic acids, artificial respiration.
Savin	Epsom salts, stimulants of ether, nitric or sulphuric demulcents.
Snake-bite	Tie a tight ligature above wound, cut out injured portion, cauterise with hot iron, large doses of alcoholic and ammoniacal stimulants, artificial respiration.
Strychnine, nux vomica	Chloroform inhaled, tobacco internally. For dogs, apomorphine, bromides, tannin.
Tobacco	Hot stimulants, strychnine, tannic acid, iodine in solution.
Turpentine	Epsom salts and demulcents.
Veratrin, hellebore	Emetics, hot coffee and stimulants, opium, tannic acid.
Yew	Stimulants, acetate of ammonia, demulcents, linseed oil.
Zinc salts	Whites of eggs, emetics, demulcents.

Chapter XX.

ANTISEPTICS AND DISINFECTANTS.

Such responsible work as disinfection is generally undertaken by persons with little or no experience. The consequence is that in nine cases out of ten a useless expense is incurred for time and material. A proper understanding of the subject—what is infection, and what we mean by disinfection—is essential if we would have our men carry out the work successfully. Because some of us know that specific diseases are propagated by bacteria of a particular kind, we are apt to assume that the terms disinfectant, antiseptic, deodorizer, etc., are understood by our servants. If we take up the most advanced medical books, or those dealing specially with hygiene, we find no such assumption, but a careful definition or explanation of the terms in such common use nowadays by the lay public. In towns, where compulsory notification and removal of patients suffering with infectious disease is strictly

carried out, sanitary inspectors or their understudies see to the efficient disinfection of premises in which men or beasts have lived; but in the country, and more particularly where animals are concerned, the job is, as before hinted, undertaken by those without special knowledge of what is required. Speaking for our own district—one of the most progressive—we rarely find a man to whom we would entrust the work of disinfection, unless with the most explicit written or verbal instructions, backed by a promise to look in and see how he has progressed.

Infection, for our present purpose, means the existence in an animal or place of germs of disease capable, under certain conditions, of being conveyed to other creatures and reproducing the malady. Many diseases have already been proved to be due to germs of a certain size and shape and capable of being identified by processes of staining, cultivation, etc., which we need not go into here; and it is assumed that others, as yet undetermined, have a similar mode of infection. It is supposed that actual contact is necessary in some cases, and a distinction used to be made between infection and contagion. This barrier has been broken down, and we speak of all transferable diseases now as infectious, although it is doubtful if such dire maladies as leprosy are contracted without contact.

Disinfectants are agents which destroy infectious germs. They do so in various ways. It may be by contact in water or in air, but the essential qualification of a disinfectant is its power to kill existing organisms. Hence we speak of disinfecting a wound or disinfecting a stable. A wound with matter in it of the nature of pus has been infected with the pyrogenic organism, and we wish to neutralise it or control its propagation. A wound may have been made with an infected knife, as in the cutting up of a diseased carcase a scratch is incurred by the knackerman. Here we wash or inject, as may appear best, with a disinfectant, because we believe that infectious matter has already been introduced, and if we are quick enough we may succeed in destroying the germs before they have had time to multiply and infect what at the moment may have been a simple wound, but probably is not.

DIFFICULTY IN OLD BUILDINGS.

The infected stable where a glandered horse has been kept has to be disinfected with a view to killing the glanders bacillus which will lurk in the mangers and woodwork and retain its vitality for a long while after ordinary cleaning, unless a destroyer has come in contact with the germs. How important, then, is this matter of disinfection. There are many old stables in London, Glasgow, and other great cities where disinfection could have been carried out many years ago, and if done would have saved many thousands of pounds' worth of horses; but owners either did nothing, from unbelief in the power of disinfectants, or slavered over some whitewash and poured some carbolic down the drains, without regard to the hay and rubbish behind mangers and cobwebs above them. The thorough disinfection of a tumble-down old stable or cow-house is no easy task, and it will be one of our objects in writing these notes to point out the most efficient means of sanitating existing sheds and stables, and not merely to enlarge upon the advantages of good modern buildings, such as we should all like to have: at the old rents.

Infection is carried from one animal to another by various means. Rabies, so far as our present knowledge goes, can only be induced by introducing the rabific virus into the circulation, by inoculation, as by a bite or injection into the tissues; while influenza may be carried through the air, and glanders can infect either by the inhalation or ingestion of germs. Our greatest authority on glanders (Hunting) was of opinion that more horses are infected

by ingestion, or the swallowing of food that has been blown upon by affected animals, than by aerial infection. It is generally agreed that it *can* be conveyed in both ways.

HOW DISEASE IS SPREAD.

The means by which infectious diseases are spread may be summarised as follows: Contact with diseased substances (solid or liquid) from the sick; water or food similarly soiled; air containing disease germs and given off from the lungs, the skin, or the ground upon which they have been kept; by human attendants who have been in association with the infected; by the removal from place to place of skins, horns, bones, offal, tallow, and dung; by placing the healthy in buildings, railway trucks, &c., which have previously contained the diseased. These are some of the commonest means of conveyance of infectious disease; but one of the most important and serious is the inadequate burial of the dead, whereby particular poisons are brought to the surface again and taken into the bodies of the living. Anthrax, for example. We have not yet arrived at a state of knowledge as to the various degrees and distances at which infection is possible, or we could adopt Dr. Parkes's rules, which include, first, the nature of the contagion; second, the means by which it is spread; third, the effect produced upon it by the action of the disinfectants employed for its destruction. We are rather in the position of the man with a lame horse, who blistered the whole limb to ensure covering the affected part, which he was not able to locate. Where matters are in the hands of an efficient sanitary police, the first thing to be done is to draw a cordon around the infected area. As to the circumference of the area necessary there is difference of opinion, the sanitarians wishing to spread as large a net as possible, and the unhappy farmers included within it deeming it all too large while it interferes with their business. Individual hardship is often suffered, and, as these measures are instituted for the benefit of the many, the many ought to pay liberally in the way of compensation to the few. Isolation of the infectious case is necessary, whether regarded from the public point of view and affecting a herd, or from the private aspect of the question, as when one gets influenza or skit in his stable or calf-house.

SPECIFIC DISEASES AFFECT PARTICULAR PARTS.

As a rule, specific diseases affect particular parts, and the poison is discharged from certain places. The nasal discharge of glanders or foot-and-mouth disease will most require precautions; the diarrhœa of cattle plague; the serum under the skin in anthrax, the desquamating skin in variola, while it is only too obvious that pleuro-pneumonia is carried in the air, and probably also tuberculosis. By such means the air, the food, the soil, and the buildings and fittings are subject to infection, and capable of reproducing disease in previously healthy animals when placed in them.

If the foregoing views of infection are accepted—and they are indisputable—what can be expected of washing down a floor and whitewashing a manger? Many millions of germs may be thus killed, but many will be left behind. Given a model building of brick or stone, that can be syringed over roof and walls with a strong carbolic solution, and a floor that can be washed with a like preparation, thorough disinfection is not beyond the capacity of an ordinarily careful man; but we more often get infection in some tumble-down old cow-shed or stable, built of wood, and perhaps thatched, or having a roof or walls to which the foregoing treatment is quite impracticable. In such cases we must resort to aerial disinfection, of which anon.

All discharges from the body, whether dung, nasal mucus (on food or litter), "cleansings," or aborted matters, should be burned or buried in quicklime—preferably burned. Where an earthen floor is concerned, at least six inches

of it should be removed, and a fresh lot introduced from an open spot where it is unlikely to have been contaminated. Stone or brick floors can have litter burned upon them, or paraffin. This may cause some cracks in mortar or cement; but filling up with cement again is but a trifling job. Of all disinfectants, fire is the most effectual—"a good servant, but a bad master." Because it is the latter, it is not often enough resorted to as a disinfectant. With reasonable precautions in the way of buckets of water at hand before commencing operations, there is not the least danger from fire; indeed, incendiaries have often confessed to failure when using their best endeavours to set alight to buildings; and when fires do occur they have made headway before being detected, and could often be put out with a bucket of water, if it were but at hand. From long experience of fire as a disinfectant, we can recommend it as both safe and effectual.

Wooden mangers, stall post, and partitions can be painted over with paraffin with an ordinary whitewash brush, and set alight, while all litter can be soaked in the same, and burned upon the floors. The novice is pretty sure to put out the fire too soon, as the great volume of smoke and of flame alarm him, until he has found that the water from a garden syringe soon extinguishes it. The woodwork should everywhere have a charred coating, to ensure perfect disinfection. Painted wood lends itself to scrubbing, and, for economic reasons, one would not apply fire. All removable fittings will, of course, be taken out, to be similarly treated. Metal buckets and fittings, not dependent on solder for union, can be heated, so as to ensure the destruction of micro-organisms. Where the construction of the buildings is such—as with thatched roofs—as to make fire unsafe, we must adopt aerial or liquid disinfection, the latter for the floor and walls, but nothing short of destructive gases will ensure the disinfection of a low shed with roof of straw, fagots, or other loose material of the kind. Floors and drains should be washed and flushed with a strong solution of carbolic acid or other reliable liquid, of not less strength than 20 per cent., as it has been distinctly proved that weak preparations only pickle disease germs instead of destroying them. There are many advertised disinfectants that are reliable, if used strictly according to instructions, but nothing better or cheaper than a 20 per cent. crude carbolic acid in boiling water. Carbolic acid, when cold, needs a solvent like glycerine to enable it to mix with water, but, used with the latter, very hot, is effectual. If, for appearance sake, whitewashing is decided upon, the acid can be added to the lime in the same proportion, and one dressing only will be required. Whitewashing has the advantage that the masters can look into the corners and see in a moment if any portion of the work has been scamped. Chloride of lime is one of the oldest and best of disinfectants, and a pound in two gallons of water makes a cheap and powerful germicide. Its objectionable smell and the discoloration of clothing and other things with which it comes in contact is responsible for its displacement in public favour, and the substitution of more elegant preparations. This objection may be overruled in farm buildings, and a considerable economy effected by its employment.

As an efficient and cheap disinfectant, a solution of chlorine may be recommended for drains, floors, and woodwork, but not for metal fittings. A simple means of obtaining it is to mix ten ounces of chlorinated lime (commonly called chloride of lime or bleaching powder) in a gallon of water, in a well-corked bottle, shaking it to-day and using it to-morrow. In these proportions larger quantities can, of course, be made, but the container must be closed or much of the chlorine escapes.

Wooden poultry houses may be painted with eight ounces of Stockholm tar mixed with one gallon of paraffin. This renders them proof against

many parasites, both visible and invisible to the naked eye. South Africans tell us that white ants will let it alone for twenty years, and we know from personal observation that they are not easily put off their fancy

EUSOL.

As a liquid disinfectant to be applied to animals, even to such delicate structures as the eye and ear, a preparation known by the above name may be applied, as, for instance, for the destruction of ear mites which cause canker in dogs and cats, and for eye blights in sheep and fly-infected discharges from the eyes, and for unhealthy issues from any part of the body. The following is the method of preparation: Two ounces each of boracic acid and chlorinated lime, mixed with a gallon of water; allowed to stand in a corked bottle for four hours and then decanted or filtered.

AERIAL DISINFECTION.

This commends itself to the scientific and the idle alike. It is effective and very little trouble. It is usually bungled; hence, seldom recommended by sanitarians who have not trained hands to carry out their recommendations. There are a choice of gases, as there are of liquid disinfectants, but the question of cost practically limits us to a few. The chief of these are sulphurous acid gas and chlorine.

The Method.—Successful fumigation and disinfection can only be carried out by making the building practically air-tight—not absolutely, but so stopped up at every door, window, hole, and crevice that air will not enter nor gas escape in any appreciable quantity. The materials for such purpose are at hand in every farmstead; it is only the labour that is required. The amount of gas to be used is estimated by the cubic space in the building. If our choice is sulphurous acid, we must allow a pound weight of sulphur for every 11¾ cubic feet, or the burning of not less than fifty ounces of sulphur to each thousand feet of air space. Rusty milk tins or other shallow vessels of no value can be utilised, or flowerpot saucers, as containers. The sulphur should be mixed, thoroughly wetted, that is to say, with methylated spirit, before being set light to, when it will burn continuously without attention, which it is impossible to give when once the sulphurous acid gas is thrown off. If one had not known a cat or a fowl to be forgotten before closing up the chamber, an apology might be necessary for reminding readers to see that no living animal is left behind. It should be kept closed for at least twenty-four hours. All utensils should be included in the general disinfection, and iron work and paint limewashed. The importance of detail is too often forgotten, and a brush or some other small object escapes, and serves as a fresh means of re-infecting the place and rendering the owner a permanent unbeliever in the whole business.

CONVEYING INFECTION.

There is every reason to believe that infectious diseases of animals are conveyed in the clothes of their human attendants, and these should be baked or boiled, as the materials of which they are made will permit. Besides conferring the "order of the bath" on these persons, they should cut and clean their nails thoroughly.

The farmer will not hesitate to bury a glandered horse or a pig dead of swine fever, but the carcase of a "struck" bullock, of which three parts are apparently good, and for which he can get a price for cat's meat instead of paying for a grave to be dug, is a different form of temptation, and one to which many succumb, while remembering that their fathers were allowed to sell the sound (?) portions for human consumption, without, so far as they are aware, ever having done any harm. So long as there is hesitation to

destroy the dead of diseases there will be infection. When all these precautions have been taken there remains the danger of conveyance by rats and other creatures not under control. Everybody in this country is probably now aware that rats have been the principal means of conveyance of the bubonic plague, and it is likely that they play a very important part in our animal plagues at home.

CHLORINE GAS.

This is, if anything, a more powerful germ destroyer than sulphurous acid, but the necessity of employing a fire to produce it in quantity militates against its general use for the purpose we have in mind. The usual method is to mix hydrochloric acid and black oxide of manganese, in the proportion of four parts by weight of acid to one of manganese. A lamp burning methylated spirit, and known to keep burning for a certain time when filled, is perhaps the safest and most convenient way of applying the necessary heat. Chloride of lime, as it is popularly called, is not a neutral salt, but lime supersaturated with chlorine gas in a chamber built for the purpose. When exposed to the air it yields up a large part of the chlorine which was but loosely held in the lime. It is a valuable disinfectant and antiseptic, but not such as can be used for the preservation of foods. Iodine and bromine may be classed with permanganate of soda and potash as too expensive for general disinfection in farm buildings. The mineral acids, as nitric, hydrochloric, sulphuric, etc., are too dangerous as caustics, and the powers of limewash are very small unless fortified with carbolic acid, a means of disinfection already advised. Perchloride or bichloride of mercury is the most powerful of all germicides, and, despite its great cost, is not ruled out, as the quantity required is so small. In the proportion of one in one thousand it is absolutely reliable, but it is a dangerous substance to place in the hands of amateurs.

DISPOSAL OF CARCASES.

The time-honoured system of burial, and the faith we have all had in the "dust to dust" method of disinfection, has been rudely shaken of late years, since Pasteur demonstrated that in the fields of Beauce it was worms that played the part of exhumers of microbes, and brought anthrax spores to the surface from sheep there buried. And still later we have the results of experiments made by Drs. Bourges and Wurtz, showing that plants can play exactly the same rôle. It has been proved—so far, indeed, as pot culture can prove these things—that the innocent radish and lettuce reproduce the bacilli of tubercle and typhoid in their leaves when watered with sewage containing the specific microbes. On the strength of these cultivations, the French Minister of Public Works has forbidden the sale of certain vegetables which are eaten raw in salads, etc., if grown upon soil watered by sewage. The sheep of Pasteur's experiment were but superficially buried, and Kock tells us that deep burial of anthracoid bodies is safe, because it limits the supply of oxygen, which is essential to the development of the spores. There should be 6 ft. of earth above the carcase, which is not quite the same thing as a grave 6 ft. deep. This method of disinfection is costly, as everyone knows who has paid for deep graves. Fire is the disinfectant *par excellence*, whether for the disposal of the carcase or the destruction of the microbes in buildings. Again, as with deep burial, there is considerable labour, and but few people have attempted a task they overestimate for want of knowledge. (*See* page 2, *re* Burning Carcases.)

THE FUNCTION OF DISINFECTANTS.

Disinfectants, then, whether employed upon the living or the dead, upon animate or inanimate objects, are agents which destroy germs of disease.

Antiseptics prevent their entrance and development. Deodorisers mask the presence of fetid odours of decomposition or stinks produced by diseased or dead animals. A disinfectant may be all three, but a deodoriser may have only the qualities of a perfume.

As an example let us quote a case that came under our notice a short time ago. A horse at grass was found lame with a few inches of an umbrella rib sticking into the frog. It was pulled out, and poulticed with plain linseed. In a week it died of tetanus (lockjaw). The tetanus bacillus was in all probability introduced on the umbrella rib. If the injury had been detected immediately it occurred, and the farrier had poured in his favourite remedy of spirit of salts (hydrochloric acid), the germs of tetanus would most likely have been killed. If an antiseptic had been freely employed during the poulticing, the tetanus germs from the floor or other source would have been prevented. In the first place, it would have been a disinfectant to a wound we assume to have been made by an infected body; in the alternative it would have acted as an antiseptic in preventing the entrance of the disease germs.

Chapter XXI.

ANÆSTHESIA—INSENSIBILITY TO PAIN.

Every humane person will rejoice at the increasing use of chloroform and other pain destroyers for animals undergoing operations, and endorse the Act making anæsthesia compulsory in certain operations, but they are still much restricted or not in such general use as could be wished. There are various reasons for this. One is the expense entailed, but a greater one is the time occupied, and not least among the objections is an element of risk.

The rapidity with which a trained castrator operates upon calves and pigs does away, to a great extent, with the need of an anæsthetic, while the expense and time occupied in performing upon large numbers is prohibitive. In a farrow of pigs some will be much more readily subdued by chloroform than others, and any attempt to treat them *en bloc* would result in either killing the most susceptible or giving an insufficient quantity to the least so. The writer is acquainted with a few breeders of such tender conscience upon the subject of inflicting pain that they are willing to submit to the expense and trouble of chloroforming each separate animal.

For operations occupying any considerable time, such as firing, unnerving, and the like, chloroform is a boon to the operator as well as to the patient, but with every desire to save pain, there are many subjects which may not be wholly anæsthetised, as in the case of horses with "chinked" backs or diseased hearts.

Anæsthesia is commonly divided into local and general. Local insensibility may be produced by several agents, chief among which are cocaine, and ether, eucaine, ethyl chloride, hydrochloride of urea and quinine, and other substances are employed, but the anæsthetist who would make himself efficient will rely upon a few agents and will watch their effects so well as to rarely have bad results.*

An example of the use of local anæsthetics is given elsewhere in connection with hay-seeds getting into the eye. For firing and other operations not necessitating the casting of the animal with hobbles, cocaine may be painted over the part or it may be injected under the skin by a hypodermic syringe in the way recommended for medicines. Some care must be exercised as

* For a full account, *see* Hobday's *Veterinary Anæsthetics.*

to the amount, or poisoning may result. A 20 per cent. solution in oil of cloves painted over the skin will render a limb so insensitive as to permit of firing while the animal stands with little or no restraint. Skin painting is perfectly safe, and the application to mucous membranes or for the removal of morbid growths can scarcely be attended with any danger.

General anæsthesia is best attained by chloroform, and for horses and cattle is practically free from risk. There are persons who will differ from this statement, but we speak with a very large experience, having used it many years before it became general in the veterinary profession, and having purposely killed horses with it by the expenditure of vast quantities. None of the costly muzzles advertised are necessary, and anyone may anæsthetise a horse when already cast in hobbles, by first saturating a sponge with chloroform, then squeezing it out so that the liquid will not run, and inserting the sponge in a nostril previously anointed with lard. The animal is forced to inspire through the sponge, by closing the other nostril with the disengaged hand, relaxing it when the breath is expired, but pressing the nostril containing the sponge just hard enough to prevent it being blown out. In this way inspiration of chloroform goes on without inspiring fresh air through the other port-hole, and the patient slows down after a preliminary whinny, when he would seem to be "babbling of green fields" or dreaming of happier days. The pulse may be entirely disregarded and the flank only observed. The rolling and comparatively insensitive eye need attract no attention save to keep out rubbish, but the jerky flank and interrupted breathing may be taken as a sign to ease off the chloroform and, if necessary, remove it altogether. If a wound has to be made in the skin the patient may be sufficiently sensitive to give a jerk when it is divided, yet quite enough "under" for the remainder of the operation, as the tissues underneath are not so sensitive as the skin, and the amateur in surgery compelled to act without professional aid will "err on the safe side."

Cattle are very good subjects for chloroform, but they should be fasted by way of preparation—a remark that applies to all animals. Many human patients who come for operations at the hospitals are fortified with a good breakfast and some brandy just before entering. They have to be kept waiting, poor things! until their courage has oozed out; or sickness follows, if chloroformed on full stomachs. Dog and cat patients much resemble human subjects, and must on no account be chloroformed on a full stomach, for they not only vomit but often die if so treated. We do not consider either dogs or cats safe subjects for total anæsthesia in the hands of amateurs, but circumstances arise in which they must either act or let animals die. Placing them in a box with chloroform on sponges and waiting for them to collapse is a rough and ready plan: the tumbling over being ascertained by turning the box on its side as soon as they cease to give sounds of movement within. They can be finished with a cone of brown paper with a sponge in it, held over the muzzle—watching the heaving of the flank, as described in the case of horses above. If an old pet has to be put out of the way without pain it may be left in the box to its fate. The lethal chambers kept by veterinary surgeons are merely compartmented boxes with glass lids or spy-holes. The animal is placed in the larger compartment, and after settling down comfortably the anæsthetic is introduced into the small chamber, where it slowly diffuses through a perforated zinc shutter and overcomes it as a rule, without fright or resistance.

If any difficulty is experienced in getting an anæsthetised subject to "come to" again, he should be placed in the fresh air and fanned, or water dashed over the head and face, and artificial respiration induced by raising and depressing the forearm.

Chapter XXII.

PHYSICKING, PURGING—HORSES, CATTLE, SHEEP, SWINE, DOGS, AND CATS.

The word "physic" is restricted in stable language to one meaning, while having a very comprehensive one to the general public. A dose of physic invariably means an aloetic ball for a horse. It is as stupid as the restriction of the word "corn" to the cereal maize on the other side of the Atlantic, but we cannot get rid of it, and it must be understood as above wherever physic is mentioned in this book.

The experience of centuries teaches us that the best purgative for horses is aloes, and the best variety the Barbadoes aloe. Cape or Socotrine aloes may be used for cattle or sheep, but prove less reliable and more disposed to cause griping pains in equine patients. Barbadoes aloes are the dearest, but it is false economy to use cheap medicines of any kind. Physic balls are sold by druggists at all sorts of prices, and made of aloes of every variety; fortified in some cases by injurious drugs of other kinds.

FIG. 97.
BOTTLE FOR DRENCHING.

FIG. 98.
THE TWITCH.

The dose is from three to eight drachms combined in a ball with a drachm or two of ginger and soft soap or treacle as an excipient, and two or more drachms of any innocent powder, as linseed meal, to make up to about an ounce weight, this being a convenient size to handle and more easily administered than a smaller bolus (*see* Administration of Medicines).

Animals under five years of age take a less dose to purge them than mature ones. The average amount for a five or six-year-old harness horse, of, say, fifteen hands two inches in height is five drachms, and for a van horse six or seven, while a big Shire may have seven or eight drachms.

Preparation for Physic.—In all cases where a dose of physic is prescribed, a better result will be obtained by preparation than by large dosage. To prepare for physic means to take away all dry food, both corn and hay, and only allow warm bran mashes. Three or more mashes will usually be sufficient, and many horses become disgusted with slops before the third is offered. As a physic ball takes about eighteen hours to operate, and the patient should be under observation when it does, it is a good plan to give the ball in the morning of one day, and be prepared to lead out for gentle exercise early the next, so that the movement may start the bowels; but it is quite unnecessary, and indeed objectionable, to continue to walk the animal about when once the purgative action has commenced. During the time the horse is "in physic" he should be allowed a plentiful supply of water which has had the chill taken off; nothing but the chill, as horses will not drink warm water. A horse under the influence of a physic ball should not be put to work, even of the lightest kind, until it has "set," which means the purgation has ceased, and the dung become more or less firm.

If a horse has been properly prepared for physic, the desired effect is practically assured, but it often happens that men give the ball with inadequate preparation, and, finding no result, give another ball on the top of it. This practice is most dangerous, and has caused the death of many horses, and the super-purgation of still more (*see* Diarrhœa). If the mistake has been made of giving a ball without the softening of mashes beforehand, a week should be allowed to elapse before giving another.

Throughout this book a physic ball or "physic" is prescribed for many and different diseases, such as foot lameness from a prick or corn or fever, and for a disease of digestion, or a big leg. To the novice it may seem remarkable that a dose of aloes internally should be advised for such widely opposite conditions, but the reader may be assured that it is good practice, proved first by long experience of horsemen, and endorsed subsequently with increased knowledge of physiology and pathology.

Our fathers erred, no doubt, in too much physicking and bleeding, but when men and horses both ate (and men drank) too much there was more justification for the lancet and the purge than we of this (may we say temperate?) generation always realise. We have allowed the pendulum to swing too far the other way, so far as horses are concerned, and if we gave a spring and autumn physic ball we are inclined to think we should have fewer cases of impaction of the bowels and digestive derangements generally. Correspondents who have not learned the simple art of giving a ball to a horse often ask if the equivalent of aloes in solution will not answer the same purposes. No, it will not act so well. A liquid dose of aloes will prove more of a diuretic, and less of a purgative, besides nausaeting the patient in the administration, but may be substituted if a ball cannot be given.

Aloes in large or small doses is often prescribed for horses with chronic lameness or with temporary congestion of the feet, and with marked benefit. There is a sympathy between the feet and the mucous lining of the alimentary canal, whereby an appeal to the bowels acts as a "derivative" to the feet. A study of the histology or microscopic anatomy and functions of these apparently widely different structures enables the student to endorse practices discovered by our predecessors, who only "saw through a glass darkly." Again, a drug which acts on the bowels, and through the medium of the circulation on the kidneys and the lymphatics, clears up swellings in distant parts.

PURGING CATTLE AND SHEEP.

Ruminants, with the vast volume of the paunch or rumen and undigested food in it, require other forms of aperients, which act the better for being administered in a large quantity of fluid. Formerly, balls were never given to cattle, under the impression that they would be returned in the cud, or miss their mark by going into the wrong stomach. This is now known to be a mistake, and some medicines are given in bolus form. Speaking, however, of purgatives, we may say that a "long" drink is the best.

As a general aperient or purgative, sulphate of magnesia, known to the public as Epsom salts, is the best all-round medicine for the purpose. Sulphate of soda, known also as Glauber's salt, is a good substitute, and in some cases preferred, but has in general practice been almost wholly displaced by the magnesian sulphate. A pound weight, with an ounce of ground ginger, in three pints of warm water, is a fair dose for an average cow, but larger doses are not at all dangerous. Within certain limits it may be said that saline purgatives are active in proportion to the amount of water in which they are dissolved, and much better results will be obtained from a pound of salts dissolved in a gallon of water than from a pound and a quarter in

only just sufficient water to effect its solution. The addition of condials such as ginger or a drachm of powdered nux vomica helps the muscular contractions of the stomach and bowels, besides elevating griping pains. For this reason large "cold" doses of salts should not be given alone.

Aloes have very much the same action upon cattle as upon horses (*see* previous page on Physic), but preference should be shown for solutions combined with salines. Cattle take a larger quantity than horses without risk, as some of the drug appears to be wasted in the great volume of the ingesta. Aloes are but soluble entirely in hot water, and draughts containing the drug in suspension need well shaking, or the important resinous portion will be left in the vessel.

The aperients which act best upon cattle are also employed for sheep, there being no difficulty other than the estimation of doses (*see* Table of Doses). As a broad rule we may take as a dose for a sheep an eighth part of what we know to be a moderate one for an average-sized bullock. Other aperients and their doses will be found in the chapter on Medicines.

SWINE.

The purging of pigs may be accomplished with almost any of the aperient drugs used in the farmer's household. In composing a posological table for swine, we are confronted with the difficulty that a pig may weigh anything from one pound to one hundred or more, and the dose must perforce be left to the judgment of the prescriber, who will ascertain for himself what a fair adult quantity should be, and then calculate by the weight of his patient.

The intractability of pigs makes us lean to the selection of remedies which can be disguised in food. But, unfortunately, some of the most efficient medicines are the most nauseous, and force must be combined with strategy if we would administer them (*see* Administration of Medicines and Methods of Control).

Aloes and salts act well upon swine, but the former is too apt to induce nausea, and with these patients we have to keep in mind the chance of losing our labour and medicaments by actual vomition, besides which the nausea may last too long and the patient lose appetite and weight—an important consideration often, in pigs fatting for show, and merely purged for a slight attack of coop sickness. Some pigs will take salts in their swill, especially if combined with some of the popular condiments. As a simple purgative castor oil and linseed may be recommended; these also will be taken by some pigs in their food, but more often require to be drenched. Jalap in powder is a comparatively tasteless and useful aperient for pigs.

Dogs and cats are purged by the same remedies as other animals, but aloes should not be given, except in gelatine capsule or ball to dogs, and on no occasion to cats. Although nausea is so easily provoked in dogs that the taste of aloes will cause the loss of the medicament, they will retain the drug in almost all cases if given as a ball or capsule, and the amount for a dose is out of all proportion to their body weight. We have often given a drachm of aloes to a medium-sized dog and only produced a copious evacuation next day but nothing approaching to a purge. It is also our experience that aloes given in this form is one of the best liver medicines for fat and pampered dogs. A cat once thoroughly nauseated with aloes will sit in a corner and dribble saliva for days, and very likely die from nothing but nausea and starvation. Castor oil, syrup of buckthorn, jalap, cascara sagrada: these are safe aperients. (For doses *see* Table.)

For other aperients for horses, cattle, sheep, pigs, dogs, or cats, *see* chapter on Medicines.

Chapter XXIII.

DISEASES OF POULTRY.

The diseases of poultry are for the most part infectious, and nearly all are due to want of thorough cleanliness. One might repeat Lord Beaconsfield's parody and say that the prevention and cure of them are to be summed up in the sentence "Sanitas sanitatis, omnia sanitas." Curative treatment is also most unsatisfactory, since individuals are of small value to the farmer. Early diagnosis is more important, with a view to stamping out or preventing the spread of disease and to correcting errors in feeding or management.

TUBERCULOSIS, OR CONSUMPTION.

This malady is responsible for much loss, and it is to be feared that, even now, many henwives are not sufficiently informed on the subject, or refuse to believe in its infectivity, until they have paid very dearly for the information.

If any unbeliever is convinced by reading these notes, the chapter will not have been added in vain.

A large number of farms and poultry yards are infected. It cannot arise *de novo*, but the introduction of a single bird from an infected flock is likely to infect the premises, and prove a permanent trouble. The expectoration of consumptive persons may be the starting-point of tuberculosis in the poultry yard. It is due to a specific bacillus which multiplies within all sorts of domesticated birds, and passing out upon the ground with the dung infects the food thrown down (too often on the same limited area) about the farm-house, which is habitually soiled and frequently damp, and offering a ready seed-bed for the germs of disease. Close cohabitation in houses with insufficient air-space, or the alternative of a cutting draught, favours the dissemination of the malady. Dirty perches and nest boxes also encourage it, and the leaving about of carcases of animals which have died of the same disease.

Sometimes rapid, sometimes slow in its invasion, as in consumption of human beings, it is nevertheless sure to end disastrously. Many dead birds are sent to the writer for examination that would have clearly demonstrated to the senders the nature of the disease had they opened the subjects themselves. The liver, kidneys, and perhaps other organs show greyish white nodules or soft patches of tubercular matter. The growth of these is occasionally arrested, and not much appears to be amiss with the fowl, until a cold caught in the draught of the fowl-house, or a spell of wet weather, brings on the acute form. The poultry-keeper loses one fowl now and again and thinks but little of it, until the numbers increase seriously, when he will do well to clear out his flock, disinfect everything employed in connection with them (*see* Disinfectants), plough or dig the ground, salt, soot, and lime it, and have a clear winter's rest at least before re-stocking. One of the great advantages claimed for the incubator is that a new flock can be quickly raised under conditions favourable to the exclusion of tuberculosis, and, provided no birds are introduced from infected places, the plague need never again afflict the stock. Bury, burn, disinfect, spare no trouble in isolation of suspects, whenever any disease appears, as prevention is indeed better than cure in the matter of poultry.

COMMON COLD, CATARRH, ROUP.

Running at the eyes and nose, "the horns" in the throat, sticking up of the feathers, drooping of the wings, dullness of behaviour and indifference to food are the prominent symptoms of a bad cold. Fowls roosting out of doors all the year round are less troubled with this complaint than those "reared up" in close houses and in bad air or subjected to draughts.

Treatment consists in better conditions, sponging the eyes and nostrils with equal parts of vinegar and water, and, with a fine-nosed metal syringe, washing out the nasal passages with a five per cent. carbolic lotion or one of boracic acid, or other simple disinfectant. A pill daily of iron and quinine will help to restore vigour, and bring hens on to lay sooner than if left merely to time and better management.

ROUP.

There is still some doubt as to the true nature of this disease. A malignant infectious form of it is recognised, but it would seem as though a bad cold may develop into roup of a milder type, or so prepare the way that the germs find pasture and thrive on it. The doubt should make us doubly careful to segregate sick birds, and afford them proper treatment, until the disease is declared or proves only to be catarrh.

Treatment.—The half-crown hen does not pay for treatment, and should be killed and burned and the house disinfected, but birds of any value may be separated and confined under healthful conditions and fumigated or drenched with medicines which are credited with curative properties, if the man is willing to take a lot of trouble.

Bathe the eyes and nostrils with warm boracic lotion (10 per cent.) and syringe up the nasal passages as for catarrh. Five per cent. lotions of lysol, creolin, phenol, chinosol, in turns may be used, but the same proportion of sulphate of iron or copper dissolved in water has given better results in the author's hands. Much of the nasal mucus may be run off (into a bowl of disinfectant) before using the dressings, by holding the patient up by the heels for a few seconds; this enables the medicament to come into more direct contact with the diseased membranes. Pills night and morning composed of one grain each quinine and carbonate of iron, with ten grains of gentian, are helpful, and as the bird cannot see to feed he should be balled with oatmeal mixed with treacle and some fine chopped meat and green food, not forgetting some grit in the composition of the food balls. Teaspoon doses of paraffin are said to cure roup if given early: one large poultry farmer declares it to be a specific, and that he is no longer afraid of the disease. Whatever treatment is adopted, it is most important to keep the convalescents away from the flock until a clean bill of health can be given.

Among the hundreds of fowls sent me for post-mortem examination through the *Farmer and Stockbreeder* are many subjects of roup which might have been cured if the owners had been bolder surgeons. The catarrh of the mouth and nostrils causes a bulging into the orbit, and the eye is immensely swollen with mucus, which later becomes pus, and then consolidates, so that the bird is blind and helpless and wastes away, and none of the remedies advised in books by amateur surgeons are of any use when the orbit is thus distended. It should be understood that the formation of pus is easily provoked in gallinaceous birds, and an abscess may occur on any part of the body or within it, but a fact proved by thousands of post-mortem examinations has never been recorded so far as we are aware by any other writer is, that abscesses do not point and break (*see* Abscesses), but, having attained their maxima, begin to undergo the change known as caseation. The fluid portion is largely absorbed, and a thick cheesey substance remains. In cases

of long standing it will be so hard (inspissated) that the novice will not realise that it was ever a fluid that he could have released with a pocket knife. The change (caseation) is very rapid, perhaps a week only: and the bulging eye is being pressed upon by this hard matter. Seldom indeed is the globe itself affected. It is in the socket or orbit that the matter forms, and a little to one side. It is a perfectly safe operation to evacuate this matter, if the operator will take a sharp narrow-bladed knife, and keep the cutting edge outwards, as advised in opening any swelling that requires it (*see* Housemaid's Knee in Cows). In the majority of cases it will be necessary to use a little pressure to get the cheesey matter out; perhaps to employ a bone salt spoon with which to scrape it out. Then the cavity should be painted with tincture of iodine. If this is repeated a few times, the case will be cured; but how long a bird remains infectious is more than one can say. It is wise to separate and make ready for the table any fowl that has once suffered from the disease. The cleft of the palate communicates with the eye socket, and syringing into that cleft enables one to bring medicaments all round the abscess.

GOING LIGHT, OR ASTHENIA.

A mysterious disease, which, from the wasting to a shadow of birds affected, makes one suspect tuberculosis. It can only be demonstrated by post-mortem examination—which, however, discloses nothing, save the extreme emaciation and blanching of all the muscular tissues. It does not appear to be infectious, if we may judge by the small numbers usually affected; but this is by no means proved. It is well to burn such carcases, until it is known to be incapable of being communicated to living birds.*

It will probably be found that some blood parasite such as produces tri-panosmiasis is the cause. The reader is referred to Diseases of the Blood in an earlier chapter, in which reference is made to the influence of pathogenic organisms that specially attack and break up the red corpuscles. Probably in asthenia a similar organism consumes them. Many of the birds submitted to the writer for post-mortem examination had literally not a drop of red blood left in them. A few cases apparently recover when daily physicked with iron in a form readily assimilated: as the saccharated carbonate made into balls with oatmeal and pushed down the throat.

MOULD, FUNGI, ASPERGILLOSIS.

In damp seasons, and on badly drained runs, a disease appears which is due to the transplantation of the common mould or fungus which gathers on trees, wet sacks, and other such sites. Some special condition of fowls probably invites its invasion. Examination of the mouth, and perhaps of the eyes and ceres, of fowls that are not thriving may reveal the mouldy deposit. It should be sponged off with a 10 per cent, solution of salicylic acid, and the iron and quinine pill recommended for roup given. Good living in a sunny dry place may be expected to restore those affected and arrest the spread of the malady.

AIR SAC MITES.

Birds are provided with a number of air bags or sacs which extend even to the bones, and contribute to their powers of flight. In the fine membrane of which they are composed parasites of microscopic proportions disport themselves. One of them is known by the above title, and there is some doubt as to whether they do not at times reside inside with soft skins, and at others live outside with a more suitable covering; or possibly enjoy two distinct periods of existence under slightly different forms. Their effect when unusually numerous is seen in the debilitated condition of the host, but they may be

* Later investigations point to the soil as being infected.

present in moderate numbers without doing any apparent harm. No treatment is likely to destroy them, and they are only referred to here in view of the great importance of parasitism, and with the object of impressing on readers the desirability of always waging war with the numerous fleas, lice, mites, and visible and invisible trespassers whose aggregate influence makes the flock unprofitable.

FLEAS, LICE, ETC.

Nests are forsaken, fowls are quarrelsome, restless, and indisposed to put on flesh at times, through the annoyance of external parasites.

It is easy to destroy them, if persistence be not deemed hard. Flowers of sulphur, Persian insect powder (pyrethrum), lime, road grit, ashes, any and all of these may serve to rid fowls of outside insects, if frequently dusted on to the skin by lifting the birds off the perch at night and holding them up by the legs, while shaking the medicaments into the opened feathers. In warm weather, the water can with a rose on may be used instead, and with a 4 per cent. cresilic lotion or 5 per cent. of carbolic acid, but washing is not for common use, and liable to give bad chills unless very carefully carried out.

It is but little service to the fowls to kill the lice upon their bodies if their houses and nest boxes do not at the same time receive attention.

SCALY LEG.

This, too, is a parasitic disease; a form of mange. The affected limb needs to be soaked in strong solution of washing soda or soap, and sulphur ointment worked into the open scales on two or three occasions, when a cure may be expected.

BUMBLE FOOT.

This unsightly enlargement is caused by bad perches; too small, or with sharp edges instead of being large and round, such as the fowl would choose if roosting in a tree. There is no cure for it when the bones are involved, but when matter forms it can be lanced and evacuated with great benefit to the sufferer. Prevention is here indicated.

CRAMP.

Chickens are very liable to cramp, especially in autumn, when dews are heavy and late. The curling up of the feet, it should be remembered, is due to spasmodic contraction of the muscles of the thigh, and if any embrocation is used it should be high up on the flesh. A few drops of essence of ginger in milk, or of brandy, a peppercorn or two, and top heat is the treatment. A hot flannel over them, to brood like a hen, is better than the hot bottle underneath—which most women think of first.

CROP BOUND.

From want of grit, too much cooked or soft food, insufficient exercise, and other causes, a state of paralysis of the crop calls for attention. A teaspoonful of castor oil, thinned with a tablespoonful of hot milk, should be poured into the throat, and with a finger and thumb the crop should be gently manipulated to aid in the distribution of the dose among the contents of the crop. Two or three such efforts should be made to dislodge the obstruction, before resorting to the knife. If oiling fails, the crop should be cut open and the food removed with care, washing the lining membrane with a lotion of boracic acid and glycerine. A stitch or two will be necessary to draw the lips of the wound together, after which the patient should only receive such sloppy food as will easily pass without straining the open wound. The return to ordinary food should be gradual.

DIARRHŒA.

A small quantity of fish refuse will be sufficient to cause diarrhœa in a large number of fowls. Other unsuitable foods cause it also. Persistent looseness of the bowels should always be regarded as of importance, as it may indicate tuberculosis (which *see*), and those members of the flock so suffering should be isolated, given dry food, and only returned when no doubt exists any longer as to the temporary nature of the malady.

APOPLEXY.

Many of the sudden deaths occurring in the poultry yard, often from the perch, or upon the nest, are due to apoplexy. High feeding and insufficient exercise are the chief causes. Maize and wheat, fed too largely, is the most frequent source of internal fat and degenerate vessels, which result in rupture and hæmorrhage into the base of the brain, or of the large veins in the abdomen; also of rupture of the enlarged liver. These are warnings sufficient for the observant, but not all poultry-keepers distinguish between the hyperæmic flush of the pullet with a laying note and the darker red which means threatening apoplexy. It may be averted by a brisk purgative consisting of a grain of calomel and five to ten grains of jalap, and the flock should receive a solution of Epsom salts to drink, in lieu of the usual drinking water. A twenty-four hours' fast may be well prescribed, and no maize allowed, but a little stable litter scattered over finer grain, by which lazy and over-fed birds will be compelled to scratch or go without. Maize has much feeding value, but it is found that fowls pick it out and live exclusively on it, if it forms a large proportion of the ration. It should be reserved for the long winter nights on the perch. It may be fed with advantage to sitting hens, as it imparts considerable heat to the body. Too much fish meal is a frequent source of this trouble. It should be fed sparingly to birds not fattening for the table.

CONSTIPATION.

Fowls confined in runs, or unable to obtain an abundant supply of water and variety of food, sometimes suffer from stoppage, but it is easily overcome by a dose of oil and change of diet. Its chief danger with hens is that it is a contributory cause of egg-bound (which *see*), and a pressure upon the outlet of the solid urine which being retained causes blood-poisoning. The white or greyish top on a fowl's dung consists of solid urates, and is evacuated at the same time as the fæces. Any accumulation of fat about the cloaca and inflammation from pressure of constipation adds to the trouble. The pressure of abdominal fat also leads to rupture of the oviduct and to compression of the eggs, and their rupture, so that a large number of fowls examined after death are found with eggs free in the abdominal cavity.

WORMS.

Most farmers are only too well aware of the ravages of worms in horses, cattle, and swine, yet it seldom occurs to think that they suffer much loss by parasitism in the poultry yard. Both round and tape worms find a home in poultry, besides a number peculiar to winged creatures. Besides those which inhabit the air passages (*see* Gapes), there are numerous intestinal worms which keep their hosts poor and reduce egg production. They are easily disposed of by giving a pill on an empty crop. It will pay twice a year to shut up fowls without any food, but with allowance of pure water, and having fasted them twenty-four hours, to give each a grain of santonine, a grain of calomel, and ten grains of areca nut in a pill. The droppings should be swept up and carefully burned.

GAPES.

On damp situations, and especially those where chickens have been raised year after year, the gape worm is a devastating enemy to the flock. *Sclerostoma syngamus* or *Syngamus trachealis* resembles the husk worm in calves and is supposed to pass an intermediate life outside the host, although it may reproduce within the living bird. The salt and soot recommended for pastures affected with husk is advised for land infected with gapes, but the poultry raiser has more choice in the matter of sites for chicken raising, and should not use the same place two years in succession.

As to treatment, the best is the "kill or cure" plan of taking each chick in hand, opening the beak, pulling out the tongue, and, with feather dipped in turpentine, applying it direct to the bunch of worms in the pipe. A violent cough follows, and results in the ejection of many and the death of still more, and if the bird does not die from getting too much turpentine down his throat he soon picks up again. Another remedy is the introduction of three drops of eucalyptus and six of petrol, using a No. 1 catheter as the conduit pipe as above.

PIP.

Many different troubles are called pip: the chief one is an inflamed and indurated tongue, with an opaque deposit upon that organ and the membranes of the mouth generally. Young medical men every now and again make known the *discovery* (?) of diphtheria among fowls, when for the first time they come across this poultry malady, which is not diphtheria, and is *not* communicable to man. A mixture of twenty grains of chlorate of potash, half an ounce of glycerine, and the like quantity of water, will prove a suitable application, and enable the membrane to detach itself, and keep healthy the tender under-surface until it has hardened off to the normal density. Soft food should be given during an attack.

EGG-BOUND.

Hens that are too fat inside (*see* Apoplexy), or that have been too closely bred from remarkable layers, are those most prone to the above trouble. The egg may be unusually large, have a double yolk, or the shell have been broken inside, by descending from a high perch in a small house. It is also due to imperfect secretion of the mucus which in ordinary conditions lubricates the passage. The vent becomes inflamed, and the hen will die if not relieved. Steaming over a bucket of hot water may be tried, and while holding the patient up by the heels a little warm olive oil may be introduced into the passage with a suitable syringe. These measures usually succeed, if the rash doctor does not break the egg intentionally or otherwise, when the difficulty is greatly increased. After-treatment consists in solitary confinement and low diet, so that the next egg or two may not mature until the affected parts have had time to regain their normal functions.

FEATHER MITES AND FEATHER EATING.

A mite of the mange type is in many instances the origin of that annoying habit of feather eating, or it may be brought on by over-feeding in confinement, with nothing to do to pass the time. The taste of blood probably perpetuates the liking for eating young feathers, which are full of it. They should be provided with occupation by covering up their food with rough litter, and giving "a well-balanced ration, consisting of skim milk, meat, bone, vegetables, or green food, and frequently varied" (Salmon). Want of sufficient grit is also thought to be a cause of this vice in fowls.

We have briefly described the common ailments of poultry, but there are serious diseases not mentioned in ordinary books dealing with them.

There is an infectious enteritis to which all gallinaceous birds are liable. Pheasants reared too thickly upon an estate are a fruitful source of infection to neighbouring fowls. Outbreaks which we have investigated have sometimes been difficult to trace to their source, and flock owners have been positive that no birds have been introduced, and that infection must be out of the question, but on further inquiry it has been elicited that a broody hen has been lent to a gamekeeper, and this has proved the source. The disease germs which give rise to this bowel complaint are passed out upon the ground in millions in the dung of an infected bird, and any wild one may carry it upon his feet when he joins the farmer's fowls at their meals. There is no reason why rats and other animals should not do the same, so that the idea of infection from outside being a difficulty is altogether absurd. Its spread, when once a fowl is introduced into the flock, is easy enough. It is facilitated by the very general custom of calling the flock to the same soiled ground to be fed twice a day, for here the bacilli will be found in vast numbers, and will adhere to the food scattered upon such tainted soil. Birds under the influence of this disease have usually but a short illness before death takes place. Drooping wings, and feathers standing the wrong way, a dark comb with pale edges accompany it, are symptoms: but diarrhœa is the most prominent of any. The behaviour of fowls when ill is much the same in all serious maladies, and the names given to diseases are commonly derived from some one marked sign, and have very little more meaning than if we called them drop-wing.

Black Head or Infectious Entero-Hepatitis in turkeys is an example of nomenclature alluded to in the foregoing paragraph. The dark red, then purple, and presently very dark colour of the comb in a dying turkey gave rise to the name in America, where "Pink-eye" is found more convenient to pronounce than influenza, although but one symptom of many, and not always a prominent one. Black Head was first described in the New England States in 1893, and was supposed to be peculiar to turkeys. We regret to say that it is very prevalent in England now, and not alone among turkeys, for hundreds of fowls have shown it unmistakably when sent to us for examination. It is caused by a micro organism (*Amœba meleagridis*), and carried in the same way as the other enteric trouble just described, namely, upon the food, soiled by the dung of an infected bird. The cæcum is the first to be infected, and from it the liver. When the disease is at all advanced, any poultry-man should be able to recognise the lesions in this organ, as they are quite different from tuberculosis. They are not deposits or tumours in it, but circular spots of a paler colour than the rest of the liver. These yellowish spots represent dead or dying tissue, and when more advanced show a slight depression, indicating actual waste or loss of structure, and therefore impossible to confuse with the deposits of tubercles. Black Head is variable in the time taken in manifesting itself, developing rapidly in young chicks, and taking comparatively long periods in adults. Hence false hopes are raised that no infectious malady has entered the flock.

No treatment of infectious enterites in chicken is of the slightest avail—a statement which is equally true of tuberculosis in fowls, and our object in describing them here is to impress the poultry breeder with the paramount importance of constant observation of the health of the flock, immediate separation of any bird that droops or fails to answer the dinner bell, and thorough disinfection. Many people are reluctant to believe what they fear, and will go on hoping that things will mend. It is far better with fowls to face the difficulty at first. Ascertain really what is the cause of death, and if it prove to be an infectious malady spare no pains to eradicate it.

The stamping out system is the only wise one except with regard to those minor ailments which we have described, and for which successful remedial measures may be taken. (*See* the subject of Disinfection.)

In recent years a good deal of evidence has accumulated in favour of very dilute medicines in the form of what may be called medicated waters; the affected birds being allowed to drink no other. On alternate days, or half days, the flock is given a solution of fifteen or twenty grains of catechu to the gallon of water, or a solution of ferrous sulphate of the same strength.

Having regard to the fact that soiling of the food by the droppings of birds already affected is the chief means of spreading the malady, it is advisable to remove to clean ground, and feed from troughs which cannot be perched upon. Round hoops over the top serve this purpose.

The most serious objection to all curative measures for this disease is the survival of so-called "carriers," who continue to pass out the infectious organisms, although apparently well themselves. Early detection and the stamping out system will be found to be the best in the long run. (*See* Medicines.)

Chapter XXIV.

ADMINISTRATION OF MEDICINE TO ANIMALS.

For want of a little instruction, such as is now given by some veterinary lecturers for county councils, practitioners are often hampered in their choice of medicaments, and compelled to prescribe the next best thing, because the man in attendance upon a sick animal is unable to administer balls or other substances. Some have had no opportunity of learning, and others are unwilling to admit their incapacity to carry out the vet.'s directions, while a third class, like the man who was asked if he could play the fiddle, "do not know if they can, because they have never tried." An animal's life may depend upon the administration of a timely bolus; this much can be asserted without attaching too much value to drugs, since it must be apparent to the veriest tyro that in a case of stoppage (a not uncommon cause of death) the giving of a so-called "physic" or aloetic ball may make all the difference. If any reader, well acquainted with modern pharmacy, with its elegant tablouds and soloids, is disposed to doubt the above statement, and would look to some other means of "therapy," we would like to say here, that experience proves that some things, such as aloes, to have the best results, must be given in the bolus form when intended to have a purgative action. It is well known to veterinary surgeons that a corresponding quantity of aloes dissolved in any suitable medium, and given as a draught, does not produce a like result, but, for some reason or other, acts more upon the kidneys and but ineffectually upon the bowels. Many examples might be given did space allow; suffice it to say that the ball cannot be dispensed with so long as we wish to give agents such as tar, camphor, ammonia, &c., for gradual solution in the stomach or small intestines. The cough ball containing tar cannot be replaced by a nauseous drench, which would put a horse with a chronic cough off his feed every time one was administered. The ball, then, we must for the present continue to dispense, and in a form which can be given with a minimum of trouble to the operator and of risk to the patient. How do we do this? The ball is commonly cylindrical and wrapped in paper; paper is not less soluble than straw; the weight and length must be confined within certain limits.

Before passing on to the manner of delivering a ball to a horse, one may be permitted to point out one of the reasons why horse balls sometimes fail to

act. In the desire for elegant preparations, such as will not grease or stain their coverings, balls are sometimes wrapped in paper dressed in paraffin wax—a substance quite insoluble in a horse's stomach. Such balls have been passed whole and picked up with their outer wrapper only dissolved. Gelatine capsules fulfil the requirements, but they are slippery in the hand, and if the "baller" misses the first time, he has a difficulty in getting it home without some other wrapper when wet.

Nearly all the fuss made about giving a horse a ball is not only superfluous but calculated to frustrate the object. It may be unwise to give a ball to a horse when tied up to the rack, because he will possibly run back, and something has to break. The cunning of the man who slips a ball into a horse in this way, and comes out of the stall trying to look as if he had done nothing, is only less absurd than fussing round with two or three men and a twitch on ear and nose and an inverted bucket to stand on (and fall off while trying to do the trick). Some persons go as far as to put a twitch on a horse's tongue and pull it out when about to administer a bolus, and I can think of no more likely way of suffocating an animal by getting the ball down the wrong way. It must, of course, be allowed that there are exceptional horses with whom some special means of restraint must be adopted, but with the average animal the giving of a ball is a simple enough matter.

First turn the patient round in the stall, then put on a hempen halter, with the tag or rope hanging free, as in Fig. 99. No assistant is required. Take the ball between the fingers of the right hand, which should have a dog-skin glove on, in order to give the operator confidence, make the hand as narrow as possible, take a large hold of the patient's tongue, with the left hand, and turn the point upwards, so as to press against the tush of the upper jaw (if there is one). Introduce the bolus quietly, but, when once the hand is inside the mouth, pass it rapidly over the tongue as far as it will go and leave the ball; withdraw the hand, quickly let go the tongue, and wind the tag of the halter round the animal's mouth without delay, turn his head slightly to the right or offside, and watch the channel of the neck on the left. The ball will be seen for a few inches in its passage down the œsophagus at the part where it first dips and then ascends over the windpipe. As some old rogues will swallow a pellet of food or some saliva, the novice may be deceived, and it is well to keep the halter in position until assured of the ball having reached its destination. It is a good plan to offer water, in a bucket above suspicion of any smell from physicky hands, for if a horse drinks ever so small a gulp you may be certain that the dose has gone its way.

Some few horses will hold a ball until the attendant has let them turn round, and then quietly drop it in the manger, but it may be remarked here that there is a position over the dorsum or back of the tongue where, if the operator once land the bolus, the patient cannot return it; he must either swallow it or cough it up if his mouth is confined by the halter.

FIG. 99. BALLING A HORSE.

A difficulty met with in some horses is a persistent cross movement of the jaw, as in grinding the food, but the extent to which they can do this is limited by the sure and large hold upon the tongue which the operator has been advised to take.

Where a horse is suspected of some disease or condition which might be communicated to the man by a scratch, a balling gun should be resorted to.

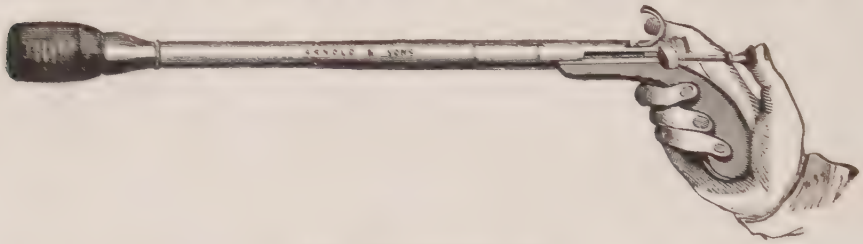


FIG. 100. BALLING GUN.

They are made in all sorts of materials and qualities; the ball is put into the open end, and when the instrument has been pushed into the horse's mouth the stilette is made to eject the ball upon the back of the tongue, as advised when using the hand. There is no art in giving a ball with a gun; neither is there any danger, as sometimes stated by persons proud of the accomplishment, of giving balls by hand.

A short man attempting to ball a tall horse may stand in a manger or astride of a stall partition, but he will require the assistance of another person to keep the animal up to him. One may avoid injury from a striker by getting on the other side of a partition at its lowest point; but where either a ball or a draught has to be given to one who is a known "boxer," or striker with his front feet, it is better to be prepared, as Fig. 99, with a sack containing two or three bushels of corn suspended from the collar of the patient. It should be fastened in the middle as well as at both ends, or the bag swings aside at a critical moment.

For horses and for other animals the electuary has a useful place in veterinary treatment. It is usually composed of one or more active ingredients, with a base of honey or some other viscid substance which will serve to retain it upon the back of the tongue while acting topically in the first instance, and subsequently by absorption, and thus through the medium of the circulation. For sore throats and coughs, where balls would be objectionable, a portion of an electuary is placed upon a paper knife or other flat smooth object and smeared upon the back of the tongue. Horses, as a rule, make but little objection to this form of medication, and the proper way to administer it is to draw out the tongue, in the manner previously described, with the left hand (Fig. 99), while introducing the medicine with the right or dis-

FIG. 101. DRENCHING A HORSE.

engaged one. As the dose has in most cases to be repeated many times, care should be taken in the first instance to use no unnecessary violence and not to upset the temper of the patient, who will soon offer no resistance when he finds no hurt from the operation. The reverse will, of course, be the case with a clumsy and unfeeling nurse.

Though a ball or an electuary is much easier to administer than a draught, most stablemen will prefer the latter. Here, again, the patient should be turned round in the stall, to avoid soiling the manger with medicine which may presently create a distaste for food, and for the further reason that he cannot back away from the bottle when his rump is against the manger. What has been said in regard to preparation for giving a ball applies largely to drenching, and, speaking from long experience, I can say that I prefer to give a drench alone, in the majority of cases, without any more restraint than one hand can afford, while the other grasps the bottle. Most horses will elevate the head when a bottle or horn is introduced into the mouth, and the support of a hand under the chin will be enough to keep the head up. In the case of a tall horse, the average man has not length enough of his own,

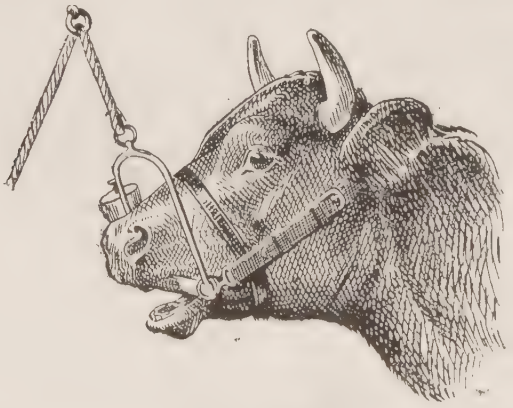


FIG. 102. A DRENCHING APPARATUS IN OPERATION.

and so must have assistance from another person, and stand upon a tub or other convenient article. A bottle has been referred to as the vehicle, and is the most convenient vessel, the more so if of the sloping-shouldered variety and transparent. The danger of fracture is not a very real one, unless the operator is particularly clumsy in letting the neck of it get between the grinders. Such a one should use a tin bottle. Of all the awkward vehicles for drenching that can be employed, a horn is the worst, unless it has been sealed over its natural opening and cut off some little distance from the tip, when it makes a model bottle, with every advantage save that of transparency. If a horse will not suffer his head to be held high enough to drench him—and it need not be at an angle more acute than 45 degrees—the least objectionable form of restraint should be first employed before resorting to twitch and strap and angry tones—which latter are absolutely useless. A twitch with a long loop should be introduced into the mouth, not first tried upon the upper lip, and if he will not then suffer himself to be drenched it may be advisable to put a twitch on his nose. It may be taken as an axiom that a drench cannot be given too slowly to a horse, and that an impatient man should never be entrusted with the task. The nose of the bottle should be made to touch the palate by way of warning, before any of its contents are poured into the mouth, and it should be with-

drawn until the animal is seen to have swallowed. The old saw of "half in and half out like a farrier's drench" is a reproach to be got rid of. When the bottle has been emptied, the patient's head should still be held up, as some individuals will retain a good deal of fluid in the mouth, and, though the previous portion of the performance may have been successful, waste a large amount at the last, when the head is freed.

DRENCHING CATTLE.

This is a task that most cowmen enter lightly upon, but veterinary surgeons will bear me out in saying that they have known not a few beasts killed by a drench going the wrong way, though probably unable to recall a case of a horse whose life has been lost in a similar manner.

The custom of putting the thumb and forefinger into the nostrils, in order to hold a beast for drenching, is objectionable, as interfering with respiration and making choking more likely. It is certainly the most masterful manner of control, but the object can usually be accomplished by getting the finger

FIG. 103. DRENCHING A COW.

of one hand into the mouth (Fig. 103), and if one has the assistance of another person (not necessary in the majority of cases) to keep the head straight by holding the horns. There are two or three things which an old hand at the job may be allowed to point out: first of all, to keep the neck straight, touch the roof of the mouth with the bottle before pouring any of the contents down the throat, and, unless the bulk is very considerable, to give it only one or two "go-downs." The swallowing capacity of a bullock is much greater than that of a horse: he is not so nervous, and when once he finds something passing down his throat he does not resist until wanting breath or relief from the constrained attitude into which he has been forced. A crooked neck at the time of drenching is the most fruitful source of choking, and, next to it, the uncertainty which accompanies the dribbling method recommended for horses. Not knowing when the drench is coming, the animal involuntarily opens the windpipe, and down goes the medicine, which he would otherwise have swallowed in the proper way. The drenching of the sheep compares with that of the ox, and the dog with the horse, in the matter of fast or slow administration.

DRENCHING PIGS.

Piggy is, of all subjects, the least amenable to discipline, and, not excepting "the harmless, necessary cat," the most difficult animal to physic when too ill to be beguiled with medicines in his food. The instrument here illustrated for pig drenching will not be found in the most recent of veterinary catalogues, but the inventor deserves a monument at the entrance to the Agricultural Hall. Nothing serves the purpose so well as this old boot with the toe cut off, for the pig cannot break it, nor reduce its value, and the angrier he gets with it the more likely is he to suck down its contents. You must, before using, "first catch your pig," and herein lies the difficulty. He must be noosed or else harnessed, and the process could only be shown by the aid of a cinematograph. (Fig. 104.)

Pigs, of all the domesticated animals, are the most prone to choking, and he who would drench them must be possessed of infinite patience and

FIG. 104. DRENCHING A PIG

not too sensitive ears, for they will continue to squeal just as long as they are held captive. The medicine must be poured slowly, and a little at a time, for fear (as already hinted) of choking.

DRENCHING DOGS AND CATS.

We are accustomed to look upon these animals as rather outside the range of the farmer and stockbreeder, yet he has, among his many other duties, sometimes to doctor the cattle or sheep dog, or the Cerberus who stands guard over his homestead. The favourite cat, too, is given a chance in these days, where, formerly, a dose of shot was commonly prescribed if anything ailed her of which she did not speedily recover unaided. To drench a dog or cat, the animal should first be wrapped up to the chin with a stout apron or soft sack. The precaution is quite necessary for dogs as well as cats, since they much oftener tear one with their nails than inflict injuries with their teeth. The need of such precaution with the cat is obvious to the individual who undertakes to physic one for the first time, but he will find himself much more likely to be bitten by a cat than by a dog. If liquid medicine is to be given to a cat or dog, the patient should not be drenched with a bottle of any sort, nor should the mouth be prised open by force. The

cheek need only be drawn out to form a funnel, and into it should be poured a little at a time, the while keeping the animal's head slightly raised, and exercising a gentle pressure on the nostrils as mothers do with babies reluctant to swallow a potion. A small spoon is the best instrument to employ, and, with patience, the object can always be accomplished. It is fear of the unknown that makes a dog struggle desperately, and when he finds there is not much to object to he becomes almost a passive agent. With pussy it is different. She will never suffer her sweet will to be thwarted, and will fight against the hundredth dose as she did against the first. We have to overcome her by craft and guile rather than the gentle force recommended for dogs. If a liquid has to be administered, it is well to take her upon one's lap and dip the finger in the medicine, and wipe it off on the inside of her lips, thus getting it conveyed a few drops at a time until the required dose is disposed of.

The larger the pill, the more readily it is given, and bulk is added in the form of some innocent powder in making up pills for dogs, and even for cats. The essence of the plan of balling these animals consists in pressing the upper lips over the most prominent teeth, whereby the animal opens his mouth involuntarily, and keeps it open to save biting his lips, which he would certainly do if he attempted to bite the finger and thumb of the operator. The next matter is to grasp the pill between the finger and thumb of the other hand, or between two fingers, where more length is required, and push the bolus forcibly over the tongue. It is practically impossible to send it the wrong way with a dog or cat, as they are so well on guard against anything entering their mouths at all. If one fails to give a pill, if is from fear of pushing it far and forcibly. The animal's head should be released directly the ball is delivered, and then, if he licks his nose, he has swallowed it ; if not, he must be watched, to see that he does not quietly deposit it round the corner.

Powders are the easiest form of medicament to administer, either to dog or cat, for, provided they are not unduly bulky, nothing more has to be done than to throw them lightly upon the moist surface of the tongue, where they cannot be shaken off, ejected, or done anything with save swallowed. Some will try to get rid of them by allowing a string of saliva to hang out of the mouth, but, without the excitation of genuine nausea to promote the flow, the shammer soon wearies of the plan, and wipes his face against some convenient object without having lost any appreciable quantity of the medicine. Cats invariably "slobber" after a powder, no matter how innocent its nature, but it is due as much to wounded dignity as to actual nausea.

ENEMAS, CLYSTERS.

Medicines are sometimes prescribed as enemata or clysters, and the larger animals need care not to introduce instruments forcibly or hurriedly, as the sphincters of the body yield on gentle pressure to the fingers, previously anointed with vaseline. The fluids must not be hotter than the naked elbow of the attendant can well support, a remark which applies equally to poultices and fomentations to the feet and other parts, much unnecessary pain and blemishing resulting from neglect or ignorance on the part of those caring for sick animals. With pigs, calves, dogs and cats, an indiarubber ball syringe is the most convenient instrument, as it liberates one hand and does not necessitate the holding of any part of the implement in the fluid to be employed ; an objection which applies to all other enemas. Every person engaged in an operation of this kind wishes he had three or four hands, and the rubber bottle is a boon at such times.

HYPODERMIC INJECTIONS.

Of all forms of medication, this cleanly and scientific method most commends itself to the up-to-date nurse. It has drawbacks which cannot be gone into here, but since farmers and stockbreeders are so advanced as to put questions concerning doses of active alkaloids to be subcutaneously employed, I shall not be in advance of them by describing the usual way of using those instruments. The needle so called is detachable, and is best inserted into the skin by taking a short hold (thereby reducing the risk of breaking) before filling the syringe. The patient feels the prick and makes a sudden movement sometimes, which may break off the highly-tempered needle, if attached to the body of the syringe, but will suffer one to attach it again without resistance after the required dose is drawn into the barrel. The care necessary to render these instruments aseptic is a barrier to their general use, but the best of them are now so made that perfect disinfection can be attained by boiling.

POWDERS.

The most popular form of medicine is the powder to be taken in the animal's food; the only trouble about it is that the patient sometimes refuses both food and medicine. Many substances calculated to either mask the taste or attract by the smell are used.

In the case of unbroken colts, it is sometimes impossible to administer medicines in the ways indicated above without throwing them as for operation.

During the past few years medication of the cow has, in certain instances, taken the form of injecting fluids into the udder. In so-called milk fever or parturient apoplexy, where it is desired to introduce an anti-toxin, such agents as iodide of potassium, chinosol, etc., are syringed up the teats and into the quarters by an ordinary enema having a common teat syphon at one end (*see* Milk Fever Outfit), its action being, of course, the reverse to that commonly known to agricultural readers. This apparatus is also useful where iodine or some other agent is to be used to obliterate a quarter which has failed from previous disease. With this, as with other methods of introducing medicines into animals by any other conduit than the stomach, special care must be exercised to avoid septic matter, and unless the attendant is willing and able to exercise all the precautions taken by the veterinary surgeon, he had better leave such forms of medication severely alone.

Chapter XXV.

MEDICINES.

The formulæ given here, for the different species of animals, belong to the "known admitted and approved" class, and will be found quite safe to employ, according to the directions given in the chapters dealing with different maladies.

BALLS.

The ball is a convenient method of giving medicines to horses when nauseous medicaments or volatile remedies must be conveyed to the stomach without exciting disgust on the part of the patient.

Powders are very generally preferred by amateurs, as the useful art of balling is not such a general accomplishment as it should be among those placed in the charge of animals. Some horses will eat very unpalatable substances in their food, more especially if mixed with table salt or condiments. The selection of powders here given will be taken in food by the great majority,

and may be horned down by water, or made into balls if the attendant prefers —or the horse does. Some stablemen resort to the practice of rubbing down balls in a mortar and giving them with a liquid. Many, but not all, balls lend themselves to this treatment.

Drenches are usually given to cattle, but balls are not difficult to give, and act as well.

Powders, where practicable, are given to swine, to dogs, and to cats, in preference to liquid medicines, on account of the difficulty of restraining these animals. *See* chapter on Administration of Medicines, also Methods of Restraint.

Aloetic, Purging, or "Physic" Ball.

Barbadoes aloes	5 drachms.
Ground ginger	1 drachm.
,, gentian	1 ,,
Soft soap	enough to make a ball.

This is an ordinary dose of physic for a medium-sized horse. Six, seven, and eight drachms of aloes are given to adults of the heavy breeds.

The reader is referred to the chapter on Physicking and Purging.

Alterative Balls.

1.	Barbadoes aloes	1 drachm.
	Resin	2 drachms.
	Linseed meal	4 ,,
	Soap (hard)	2 ,,
	Glycerine	enough to form a ball.
2.	Barbadoes aloes	1 drachm.
	Emetic tartar	1 ,,
	Hard soap	2 drachms.
	Linseed meal	3 ,,
	Treacle	enough to form a ball.
3.	Barbadoes aloes	2 drachms.
	Nitre	2 ,,
	Ginger	2 ,,
	Gentian powder	1 drachm.
	Black antimony	½ ,,
	Soft soap	enough to form a ball.
4.	Barbadoes aloes	2 drachms.
	Soft soap	2 ,,
	Linseed meal	4 ,,
	Honey	enough to make a ball.
5.	Barbadoes aloes	1 drachm.
	Gentian powder	1 ,,
	Ginger ,,	1 ,,
	Nitrate potash	2 drachms.
	Resin	2 ,,
	Syrup	1½ fl. ,,
	To make one ball.	
6.	Cream of tartar	1 drachm.
	Barbadoes aloes	1 ,,
	Ginger	1 ,,
	Nitre	1 ,,
	Precipitated sulphur	2 drachms.
	Emetic tartar	½ ,,
	Honey	enough to make a ball.

Anodyne or Pain Allayers.

1. Opium - - - - - - - - - - - 1 drachm.
   Chloral hydrate - - - - - - - - - 2 drachms
   Bromide of potassium - - - - - - - - $1\frac{1}{2}$ „
   Carbonate of ammonium - - - - - - - - 1 drachm.
   Linseed meal and treacle enough to make a ball weighing one ounce.
2. Extract of Indian Hemp - - - - - - - 6 drachms.
   Linseed meal - - - - - - - - enough to make a ball.
3. Extract of Belladonna - - - - - - - - 2 drachms.
   Aqueous Extract Opium - - - - - - - - 2 „
   Linseed Meal - - - - - - - - enough to make a ball.
4. Chloral - - - - - - - - - - - 2 drachms.
   Bromide of ammonium - - - - - - - - 2 „
   „ potassium - - - - - - - - - 2 „
   Linseed - - - - - - - - - enough to make a ball.

Astringent Balls.

(For diarrhœa or superpurgation.)

1. Cascarilla bark in powder - - - - - - - 1 drachm.
   Cinnamon bark „ - - - - - - - - 1 „
   Opium - - - - - - - - - - - 1 „
   Catechu - - - - - - - - - - $2\frac{1}{2}$ drachms.
   Oak bark in powder - - - - - - - - 2 „
   Glycerine - - - - - - - - enough to make a ball.
2. Carbonate of bismuth - - - - - - - - 2 drachms.
   Compound aromatic powder - - - - - - - 2 „
   Cassia bark - - - - - - - - - - 1 drachm.
   Prepared chalk - - - - - - - - - 4 drachms.
   Honey - - - - - - - - - enough to make a ball.
3. Alum - - - - - - - - - - - 4 drachms.
   Extract of witch hazel - - - - - - - - 2 „
   Catechu - - - - - - - - - - - 1 drachm.
   Opium - - - - - - - - - - - 1 „
   Elm bark - - - - - - - - - - 2 drachms.
   Honey - - - - - - - - - enough to make a ball

Condition Balls.

1. Powdered fenugreek - - - - - - - - 2 drachms.
   Carbonate of iron - - - - - - - - - 40 grains.
   Nitre - - - - - - - - - - - 1 drachm.
   Sublimed sulphur - - - - - - - - - 2 drachms.
   Liver of antimony - - - - - - - - - 1 drachm.
   Aniseed powder - - - - - - - - - 1 „
   Treacle - - - - - - - - - enough to form a ball.

Newmarket Special Condition Balls.

Not more than three of these should be given in all, and they should be administered at intervals of about five days.

2. Barbadoes aloes - - - - - - - - - 30 grains.
   Nitre - - - - - - - - - - - 60 „
   Resin - - - - - - - - - - - 60 „
   Capsicum, powdered - - - - - - - - - 1 scruple.
   Emetic tartar - - - - - - - - - - 30 grains.
   Linseed meal - - - - - - - - - - $4\frac{1}{2}$ drachms
   Treacle - - - - - - - - - enough to form a ball.

3. Calomel - - - - - - - - - - - 30 grains.
Black antimony - - - - - - - - - 60 ,,
Caraway, powdered - - - - - - - - 4 drachms.
Gentian - - - - - - - - - - - $2\frac{1}{2}$,,
Glycerine - - - - - - enough to make a ball.
To be given two weeks apart, three in all.

Cordial, Stimulating or Appetising Balls.

1. Ginger - - - - - - - - - - - 1 drachm.
Gentian - - - - - - - - - - - 1 ,,
Aniseed - - - - - - - - - - - 1 ,,
Caraway - - - - - - - - - - - 1 ,,
Grains of Paradise - - - - - - - - - 1 ,,
Sweet pepper - - - - - - - - - - 1 ,,
Fennel seeds, ground - - - - - - - - 1 ,,
Honey - - - - - - - enough to make one ball.

2. Carbonate of ammonia - - - - - - - 2 drachms.
Camphor - - - - - - - - - 1 drachm.
Aromatic powder - - - - - - - - 1 ,,
Canella, powdered - - - - - - - - 1 ,,
Cassia bark, powdered - - - - - - - 1 ,,
Gentian - - - - - - - - - - 1 ,,
Cummin seeds, powdered - - - - - - 1 ,,
Honey - - - - - - - enough to make one ball.

The above should be enclosed in a gelatine capsule, not in paper wrapper, unless used within a few days.

3. Ginger - - - - - - - - - - - $\frac{1}{2}$ ounce.
Cayenne - - - - - - - - - - - 2 scruples.
Aniseed - - - - - - - - - - - 3 drachms.
Treacle - - - - - - - - enough to form a ball.

Cough Balls.

1. Extract of belladonna - - - - - - - 1 drachm.
Powdered squill - - - - - - - - 20 grains.
Barbadoes aloes - - - - - - - - 1 drachm.
Nitrate of potash - - - - - - - - 2 drachms.
Linseed meal - - - - - - - - 4 ,,
Balsam of sulphur - - - - - enough to make a ball.

2. Camphor - - - - - - - - - - 1 drachm.
Digitalis leaves powdered - - - - - - - 40 grains.
Gum ammoniacum - - - - - - - - 1 drachm.
Barbadoes aloes - - - - - - - - 40 grains.
Nitrate of potash - - - - - - - - 1 drachm.
Stockholm tar - - - - - - - - 2 drachms.
Linseed meal - - - - - - - enough to make a ball.

3. Compound tincture of chloroform and morphine - - 2 drachms.
Squill - - - - - - - - - - - 40 grains.
Ipecacuanha - - - - - - - - - 20 ,,
Stockholm tar - - - - - - - - - 1 drachm.
Linseed meal - - - - - - - enough to make a ball.

4. Tartar emetic - - - - - - - - - 1 drachm.
Cream of tartar - - - - - - - - - 1 „
Opium - - - - - - - - - - 1 „
Camphor - - - - - - - - - 40 grains.
Nitre - - - - - - - - - - 1 drachm.
Linseed meal - - - - - - - - - 2 drachms.
Stockholm tar - - - - - - enough to make a ball.

Chronic Cough Ball.

(To be used for broken wind and roaring.)

Arsenious anhydride - - - - - - - - 6 grains.
Digitalis leaves, powdered - - - - - - - 1 drachm.
Opium - - - - - - - - - - 30 grains.
Mutton suet - - - - - - - - - 4 drachms.
Linseed meal - - - - - - - - - 2 „
Stockholm tar - - - - - - enough to make a ball.

Diabetic Ball.

(In cases of profuse staling and thirst.)

1. Iodine - - - - - - - - - - 30 grains.
Iodide of potassium - - - - - - - - 60 „
Powdered nut galls - - - - - - - - 1 drachm.
Sugar of lead - - - - - - - - - 15 grains.
Nux vomica, powdered - - - - - - - - 30 „
Gentian - - - - - - - - - - 3 drachms.
White sugar - - - - - - - - - 1 drachm.
Glycerine - - - - - - - enough to make a ball.
Dose, one daily.

2. Nut galls - - - - - - - - - 2 drachms.
Opium - - - - - - - - - - 30 grains.
Sugar of lead - - - - - - - - - 20 „
Caraway, powdered - - - - - - - - 5 drachms.
Syrup - - - - - - - - - enough to make a ball.
Dose one daily.

Diaphoretic Ball.

Guaiacum resin in powder - - - - - - - 1 drachm.
Emetic tartar - - - - - - - - - ½ „
Sublimed sulphur - - - - - - - - 2 drachms.
Nitre - - - - - - - - - - 1 drachm.
Linseed meal and treacle enough to make a ball weighing one ounce.

Diuretic Balls.

1. Powdered Resin - - - - - - - - - 2½ drachms
„ Nitre - - - - - - - - - 2½ „
„ Sulphur - - - - - - - - - 2½ „
Soft soap - - - - - - - - enough to make a ball.

2. Nitrate of potash - - - - - - - - - 1 drachm.
Dried sulphate of sodium - - - - - - - 1 „
Resin - - - - - - - - - - 1½ drachms
Linseed meal - - - - - - - - - 3½ „
Treacle - - - - - - - - - enough to make a ball.

3. Acetate of potash - - - - - - 1 drachm.
White hellebore - - - - - - 15 grains.
Venice turpentine - - - - - - 4 drachms.
Linseed meal - - - - - 4 „
Mix. For one ball.

4. Nitre - - - - - - 1 drachm.
Barbadoes aloes - - - - - 1 „
Hard soap - - - - - 4 drachms.
Balsam of sulphur - - - - - 1 drachm.
Resin - - - - - - - 1 „
Ginger - - - - - - - 1 „
Syrup - - - - - - - - - enough to make one ball.

Fancy or Acidema Balls.

(For swelled legs, "Monday-morning" disease, etc.)

Chlorate of potash - - - - - - - 1 drachm.
Sulphate of copper - - - - - - 1 „
Hellebore powder - - - - - - 10 grains.
Nux vomica - - - - - - 20 „
Resin - - - - - - - - 1½ drachms.
Nitre - - - - - - - - 1½ „
Hard soap - - - - - - - 1½ „
Glycerine - - - - - - - - enough to make a ball.

Grease Balls.

(For itchy legs, stamping and rubbing, or broken out.)

Arsenious anhydride - - - - - - - 6 grains.
Sulphate of copper - - - - - - - 1 drachm.
Sulphate of zinc - - - - - - - 1 „
Nitrate of potash - - - - - - - 2 drachms.
Linseed meal - - - - - - - 3 „
Venice turpentine - - - - - - enough to make a ball.

Fever Balls.

1. Tartarised antimony - - - - - - - 1 drachm.
Powdered camphor - - - - - - 1 „
Cream of tartar - - - - - - - 1 „
Nitre - - - - - - - - 1 „
Gentian - - - - - - - - 3½ drachms.
Syrup - - - - - - - - enough to form a ball.

2. Acetate of potash - - - - - - - 1 drachm.
Carbonate of ammonia - - - - - - 1 „
Opium - - - - - - - - 20 grains.
Nitre - - - - - - - - 2 drachms.
Aniseed - - - - - - - - 3 „
Treacle - - - - - - - - enough to form a ball.

3. Barbadoes aloes - - - - - - - 1 drachm.
Carbonate of ammonia - - - - - - 1½ drachms.
Linseed meal - - - - - - - 5 „
Glycerine - - - - - - - - enough to form a ball.

Liver Balls.

1. Calomel - - - - - - - - - - - 20 grains.
   Barbadoes aloes - - - - - - - - - 40 „
   Ipecacuanha - - - - - - - - - 40 „
   Potassium nitrate - - - - - - - - - 60 „
   Hard soap - - - - - - - - - 1 drachm.
   Linseed meal - - - - - - - - - 3½ drachms
   Syrup - - - - - - - - enough to form a ball.

2. Barbadoes aloes - - - - - - - - - 2 drachms.
   Calomel - - - - - - - - - - 1 drachm.
   Ginger - - - - - - - - - - 2 drachms.
   Linseed meal - - - - - - - - - 3½ „
   Treacle - - - - - enough to form a ball; for a bad case.

Tonic Balls.

1. Quinine - - - - - - - - - - 1 drachm.
   Sulphate of iron - - - - - - - - 1 „
   Gentian - - - - - - - - - - 2 drachms.
   Caraway - - - - - - - - - 1 drachm.
   Cummin - - - - - - - - - 1 „
   Ginger - - - - - - - - - 1 „
   Treacle - - - - - - - - enough to form a ball.
   Dose, one daily.

2. Saccharated carbonate of iron - - - - - 2 drachms.
   Cinchona bark - - - - - - - - 2 „
   Cinnamon bark - - - - - - - - 1 drachm.
   Fenugreek - - - - - - - - 2½ drachms
   Syrup - - - - - - - - enough to form a ball.

3. Ginger - - - - - - - - - - 2 drachms.
   Gentian - - - - - - - - - 2 „
   Peruvian bark - - - - - - - - 2 „
   Calumba root - - - - - - - - - 1 drachm.
   Cassia bark - - - - - - - - 1 „
   Treacle - - - - - - - - enough to form a ball.
   One daily.

Worm Balls.

1. Santonine - - - - - - - - - 1 drachm.
   Barbadoes aloes - - - - - - - - 80 grains.
   Sulphate of iron - - - - - - - - 2 drachms.
   Areca nut - - - - - - - - - 3 „
   Oil of male fern - - - - - - - - 1fl. drachm.
   Mix. For one ball, to be given after twenty hours' fasting.

2. Thymol - - - - - - - - - - 15 grains.
   Barbadoes aloes - - - - - - - - 2 drachms.
   Sulphate of iron - - - - - - - - 1 drachm.
   Fennel seeds - - - - - - - - 2 drachms.
   Santonine - - - - - - - - - 1 „
   Venice turpentine - - - - - sufficient to make a ball.
   To be given on an empty stomach.

3. Santonine - - - - - - - - - - 1 drachm.
Barbadoes aloes - - - - - - - - 3 or 4 drachms.
Extract gentian - - - - - - - - - 3 „
Mix and make into a ball.

This is a favourite in Australia, and is recommended in Mr. Galvayne's "Twentieth Century Book of the Horse."

4. Tobacco in fine powder - - - - - - - - 1 drachm.
Emetic tartar - - - - - - - - - 1 „
Sulphate of iron - - - - - - - - - 2 drachms.
Aloes - - - - - - - - - - - 1 drachm.
Venice turpentine - - - - - - - - - 2 drachms.
Mix. For one ball, to be given fasting.

ELECTUARIES.

(For sore throat and cough where balls or drenches cannot be given.)

Extract of belladonna - - - - - - - - 60 grains.
Nitrate of potash - - - - - - - - - 180 „
Chlorate of potash - - - - - - - - - 180 „
Honey enough to make one ounce in all.

Dose, one teaspoonful on the back of the tongue three times in twenty-four hours.

ELECTUARY FOR WOODEN TONGUE (ACTINOMYCOSIS).

Mercuric iodide - - - - - - - - - 16 grains.
Iodide of potassium - - - - - - - - 32 „
Honey - - - - - - - - - - - 2 ounces.

Mix. To be smeared over the broken surfaces and as much as one ounce at a time to be swallowed. Repeat on alternate days.

DRAUGHTS OR DRENCHES OR "DRINKS" FOR HORSES.

Colic, gripe or fret draught. Where pain is acute and stoppage suspected.)

1. Solution of aloes (1 in 4) - - - - - - - 2 fl. ounces.
Compound tincture of chloroform and morphine - - 4 drachms.
Dill water - - - - - - - - - - 16 fl. ounces.

For Flatulent Colic.

(Where the pain is less acute but the flanks blown.)

2. Spirit of nitrous ether - - - - - - - - 1 fl. ounce.
Laudanum - - - - - - - - - 1 „
Peppermint water to - - - - - - - - 1 pint.

Or the following:—

3. Spirit of turpentine - - - - - - - - 2 fl. ounces.
Tincture of ginger - - - - - - - - 1 fl. ounce.
Laudanum - - - - - - - - - ½ „
Linseed oil - - - - - - - - - 1 pint.

Or this:—

4. Compound spirit of ammonia - - - - - - 1 fl. ounce.
Chloric ether - - - - - - - - - 1 „
Camphor water to - - - - - - - - 1 pint.

TONIC DRAUGHTS.

1. Carbonate of ammonium - - - - - - - 2 drachms.
   Compound infusion of gentian - - - - - 15 fl. ounces.
   or Tincture of gentian - - - - - - - 1 ounce.
   and water - - - - - - - - - - 15 ounces.

2. Quinine - - - - - - - - - - - 1 drachm.
   Dilute nitro hydrochloric acid - - - - - 4 drachms.
   Infusion of quassia - - - - - - - - 4 fl. ounces.
   Water - - - - - - - - - - - 11 „

3. Tincture of ferric chloride - - - - - - 2 fl. drachms
   Glycerine - - - - - - - - - - 3 ounces.
   Peppermint water - - - - - - - - 15 „

4. Tincture of nux vomica - - - - - - - 2 drachms.
   Extract of gentian - - - - - - - - 1 drachm.
   Infusion of calumba - - - - - - - 16 ounces.
   Dilute nitric acid - - - - - - - - 2 drachms.

Draught for Rheumatism.

Salicylate of soda - - - - - - - - - ½ ounce.
Tincture of guaiacum - - - - - - - - 4 drachms.
Skim milk - - - - - - - - - - 15 fl. ounces.

HORSE POWDERS.

Alterative Powders.

1. Black antimony - - - - - - - - - 1 drachm.
   Sublimed sulphur - - - - - - - - 2 drachms.
   Fenugreek - - - - - - - - - 1½ „
   Resin - - - - - - - - - - 1 drachm.
   Nitre - - - - - - - - - - 1 „

Mix. For one dose.

2. Flowers of sulphur - - - - - - - - 1 drachm.
   Tartarated antimony - - - - - - - 1 „
   Fennell fruit - - - - - - - - - 1½ drachms
   Aniseed - - - - - - - - - - 2 „
   Nitrate of potash - - - - - - - - 1½ „

Mix. For one dose.

3. Nitre - - - - - - - - - - 1 part.
   Liver of antimony - - - - - - - - 1 „
   Ginger - - - - - - - - - - 1 „
   Cream of tartar - - - - - - - - 2 parts.
   Sulphur - - - - - - - - - - 4 „
   Fenugreek - - - - - - - - - 4 „
   Gentian - - - - - - - - - - 4 „

Mix. Dose, a tablespoonful in the feed, night and morning.

Astringent Powder.

(For Diarrhœa or for washy horses.)

1. Catechu gum in powder - - - - - - - 2 drachms.
   Cassia bark - - - - - - - - - 1 drachm.
   Opium - - - - - - - - - - 30 grains.
   Prepared chalk - - - - - - - - - 3 drachms.

Mix. For one dose.

2. Bismuth carbonate	2 drachms
Oak bark in powder	4 „
Prepared chalk	2 „

Mix. For one dose.

Condition Powders.

(For getting horses into hard and show condition, making the coat shine. Must be given over a considerable time.)

Oxide of antimony	1 drachm.
Resin	1 „
Sulphur	2½ drachms.
Nitre	1 „
Aniseed	1 drachm.
Gentian	1 „
Caraway	1 „

Mix. For one dose, to be given every night in a damped feed. Heavy Shires may have this dose night and morning.

Newmarket Condition Powders.

Calomel	20 grains.
Flowers of sulphur	100 „
Aniseed powder	100 „

Mix. For one powder, to be given three times in a fortnight.

Show Condition and Appetising Powders.

Locust bean	6 ounces.
Aniseed	2 „
Gentian root	1 ounce.
Caraway	1 „
Liquorice	1 „
Grains of paradise	1 „
Ginger	1 „
Nitre	1 „
Sulphur	1 „
Resin	1 „

Mix. Dose, one to two tablespoonfuls night and morning on damped food.

Condition Powders.

Aniseed	6 ounces.
Nitre	5 „
Fenugreek	7 „
Sulphur	5 „
Emetic tartar	2 „
Resin	4 „

Mix. Dose, one tablespoonful at night on damped food.

Cordial Powder.

Cinnamon bark powdered	2 drachms
Ginger	3 „
Aniseed	1 drachm.
Cummin	1 „

Mix. For one dose.

Cough Powders.

1. Camphor - - - - - - - - - - 60 grains.
   Ammoniacum - - - - - - - - 50 ,,
   Squill - - - - - - - - - - 60 ,,
   Aniseed - - - - - - - - - - 120 ,,
   Table salt - - - - - - - - - 120 ,,

Mix. For one dose. To be given in mash or on damped corn and chaff.

2. Belladonna leaves powdered - - - - - - 2 drachms.
   Liquorice root powdered - - - - - - 2 ,,
   Digitalis - - - - - - - - - - 20 grains.

Mix. For one dose.

3. Nitrate of potash - - - - - - - - 1 drachm.
   Tartar emetic - - - - - - - - - 1 ,,
   Squill - - - - - - - - - - $\frac{1}{2}$,,
   Ipecacuanha - - - - - - - - - $\frac{1}{2}$,,
   Digitalis - - - - - - - - - - 1 ,,

Mix. For one dose.

Fever Powders.

1. Nitrate of potash - - - - - - - - 1 ounce.
   Dried sulphate of magnesia - - - - - - 1 ,,
   Chlorate of potash - - - - - - - - 1 drachm.
   Bicarbonate of soda - - - - - - - 1 ,,

Mix. For one dose.

2. Tartarated antimony - - - - - - - 40 grains.
   Potassium nitrate - - - - - - - - $1\frac{1}{2}$ drachms
   Potassium bicarbonate - - - - - - - 2 ,,

Mix. For one dose.

Tonic Powders.

Sulphate of iron - - - - - - - - 40 grains.
Sulphate of copper - - - - - - - - 30 ,,
Ginger - - - - - - - - - - 60 ,,
Gentian - - - - - - - - - - 60 ,,
Canella - - - - - - - - - - 60 ,,
Cummin - - - - - - - - - - 60 ,,

Mix. For one powder.

Vegetable Tonic.

Ginger, Gentian, Calumba, Cascarilla, Cinchona, Aniseed - - - - - - - - of each, equal parts.

Dose, a tablespoonful night and morning on the food, made damp.

Worm Powders.

1. Calomel - - - - - - - - - - 1 ounce.
   Emetic tartar - - - - - - - - - 2 ounces.
   Sulphurated antimony - - - - - - - 6 ,,
   Ginger - - - - - - - - - - 3 ,,
   Gentian - - - - - - - - - - 4 ,,

Mix. Dose, half an ounce to one once, fasting

2.	Santonine	40 grains.
	Exsiccated sulphate of iron	1 drachm.
	Barbadoes aloes	1 „
	Table salt	4 drachms.

Mix. For one dose.

3.	Tartarated antimony	1 drachm.
	Sulphate of iron	1½ drachms.
	Areca nut	4 „
	Table salt	4 „

Mix. For one dose, fasting.

Outward Applications—Liniments.

Before making for himself or ordering of the dispensing chemist any of the outward applications requiring spirit of wine the reader is asked to peruse the letter here reproduced from the *Farmer and Stock-Breeder*.

"METHYLATED SPIRIT IN VETERINARY MEDICINE.

"Sir,—The pettifogging spirit which actuates the lower ranks of Excise officers has recently been demonstrated by a summons against a chemist for supplying a methylated iodine liniment for cattle when pure spirit of wine might have been used at ten times the cost, and the revenue have profited by the farmer's misfortune. Methylated spirit is pure spirit of wine with a percentage of naphtha added or methyl alcohol, in order to make it unfit to drink, in place of ordinary popular forms of alcohol. This concession was made many years ago to the numerous trades requiring alcohol for various processes, as furniture polish, varnish, and many other uses in the arts and crafts. If this is the 'spirit' in which the Spirit Acts are to be administered, a spirited protest should be made. Farmers already pay much more than their share of rates and taxes, without the law being strained against them in this way.

"Many of the tinctures require pharmaceutical knowledge to prepare, and some apparatus. In the case of tincture of iodine this is fortunately not the case, and if the law interferes with the sale of a methylated tincture it does not forbid anyone from making it for his own use. If you want a convenient quantity, say a gill or quarter-pint, the following simple directions will provide five ounces of tincture of iodine for veterinary use:—Iodine crystals one drachm, iodide of potassium one drachm; put them in a six-ounce bottle, pour on a teaspoonful (one drachm) of water, and ten minutes later add enough methylated spirit to make up to five ounces. A bottle marked with six parts affords a measure, but the tincture should not be kept in such a one, a green poison bottle being the right thing, not forgetting a conspicuous label, upon which you may write 'home-brewed' without incurring a penalty, if you think a view of the bottle would do the eyesight of the local exciseman a real benefit."

Iodine Liniment.

Iodine crystals	1 drachme.
Iodide of potassium	120 grains.
Veterinary soap liniment	4 fl. ounces.

Liniment for Cracked Heels and Mud Fever.

Solution of subacetate of lead	1 part.
Linseed oil	7 parts.

Mix.

Liniment for Splints.

Oil of thyme	2 ounces.
Oil of turpentine	2 „
Croton oil	1 ounce.
Methylated spirits	2 ounces.

Mix.

Liniment for Thrush, Canker, and Foot Rot.

Sulphuric acid	4 drachms.
Linseed oil	2 ounces.
Stockholm tar	4 „
Venice turpentine	6 „

Melt together all the ingredients over hot water and add the acid lastly and out of doors.

Sweating Liniments.

1. Oil of turpentine - 1 part.
   Linseed oil - 2 parts.

Mix.

2. Perchloride of mercury - 1 drachm.
   Methylated spirit of wine - 2 fl. ounces.

Mix.

3. Camphor - 2 ounces.
   Soft soap - 5 „
   Oil of thyme - 1 ounce.
   Liquid ammonia - 3 ounces.
   Water - 6 „
   Methylated spirit - 1 pint.

Mix.

These remedies are applied with some degree of friction day by day until an exudation (sweating) is caused, when they are desisted from for a few days and again resumed until the desired effect is obtained.

White Oils.

1. Olive oil - 4 fl. ounces.
   Oil of turpentine - 1 ounce.
   Liquid ammonia - 1 „

Shake together.

2. Oil of thyme - 1 fl. ounce.
   Oil of turpentine - $3\frac{1}{2}$ ounces.
   Liquid ammonia - 3 „
   The yolks of two hen's eggs.
   Vinegar - 1 pint.

3. Camphor	1 ounce.
Acetic acid	15 ounces.
Alcohol (90 per cent.)	18 ,,
Oil of turpentine	51 ,,
Six eggs.	
Distilled water	45 ,,

Mix.

This formula is taken from the "Pharmaceutical Journal Formulary."

Veterinary Soap Liniment.

Soft soap	8 ounces.
Methylated spirits	10 ounces.
Water	10 ,,

Mix.

LOTIONS.

Lotion for Saddle and Harness Galls.

Burnt Alum	1½ drachms.
Salt	2 ,,
Dilute sulphuric acid	1 ,,
Water	1 quart.

Mix.

Lotion for Cracked Heels.

Methylated spirit	1 fl. ounce.
Colza oil	1 ,,
Solution of lead subacetate	1 ,,

Mix.

Drying Lotion for Cracked Heels and Ulcers.

Alum	1 ounce.
Sugar	½ ,,
Water	1 quart.

Dissolve.

Lotion for Grease and Thrush.

Sulphate of copper	4 drachms.
Sulphate of zinc	1 ,,
Treacle	2 ounces.
Water	to 1 quart.

White-legged horses should be dressed with sulphate of zinc lotion in the proportion of 1 lb. of commercial sulphate to 2 gallons of soft water.

Lotion for Mallenders and Sallenders.

Salicylic acid	2 drachms.
Glycerine	1 ounce.
Water	to 1 pint.

OINTMENTS.

Castrator's ointment or salve, *see* Castration.

Healing and Antiseptic Ointment.

Carbolic acid	10 drops.
Oxide of zinc	60 grains.
Lard	7 drachms.

Mix.

Digestive or Drawing Ointment.

Venice turpentine	1 ounce.
Lard	3 ounces.

Melt together and stir until quite set.

Ointment for Galls and Sitfasts.

Fuller's earth	2 drachms.
Chinosol	1 drachm.
Glycerine	2 drachms
Lard	2 ounces.

Mix cold.

Ointment for Cracked Heels.

1. Verdigris in fine powder 1 ounce.
   Resin ointment 1 „
   Suet melted and strained 7 ounces.

Melt together and stir until set.

2. Oxide of zinc in powder 1 drachm.
   Pure carbolic acid 20 drops.
   Lard 7 drachms.

Mix.

3. Calamine 1 drachm.
   Boracic acid ½ „
   Vaseline 7 „

Ointment for Mallenders and Sallenders.

Finely powdered red precipitate	20 grains.
„ „ burnt alum	40 „
Lanoline ointment	1 ounce

Mix. Apply alternate nights.

Ointment for Canker of Ears in Dogs and Cats.

Acid boric	20 grains.
Oxide of zinc	40 „
Glycerine	1 drachm.
Benzoated Lard	1 ounce.

Mix. Fill the ear nightly.

BLISTERS.

Strong Iodine Blister.

Biniodide of mercury	1 part.
Lard or vaseline	6 parts.

Mix.

Medium Strength Iodine Blister.

Biniodide of mercury	1 part.
Lard or vaseline	8 parts.

Mix.

Mild Iodine Blister.

Biniodide of mercury	1 ounce.
Lard or vaseline	11 ounces.

Mix.

Cantharidine, or "Fly" Blisters.

1. Spanish flies	1 ounce.
Venice turpentine	1 "
Lard	7 ounces.

Mix, and melt together over a gentle heat for twelve hours, strain, and stir until set.

2. Cantharides in powder	1 ounce.
Perchloride of mercury	1 "
Vaseline	10 ounces.

Mix. This is a very strong blister, and sold under fancy names as an absorbent of ringbone and sidebone. Care must be taken not to slough away the skin of light-bred horses.

3. Cantharides in powder	1 ounce.
Oil of Thyme	1 "
Lard	2 ounces.

Mix. This is a strong fly blister suited to broken-down tendons.

Cattle Blister for Rheumatism or Crankums.

Strong liquid ammonia	2 ounces
Spirit of turpentine	2 "
Linseed oil	6 "

Charges and Blister Charges.

Where charges are to be applied the hair must be closely clipped and the scurf brushed out. The charge must be applied sufficiently warm to spread but not hot enough to scald (which is easily done), and the operator should dip his fingers in oil to prevent them sticking. Tow, chopped fine, is plastered over the spread charge, as a protection against the collection of brambles and straw, etc.

1. Beeswax	1 ounce.
Burgundy pitch	5 ounces.

Melt together.

2. Burgundy pitch	2 parts.
Olive oil	2 "
Oil of turpentine	2 "

Melt together.

3. Venice turpentine	2 ounces.
Spanish fly	2 drachms.
Beeswax	5 ounces.
Burgundy pitch	2 pounds.

Melt together and stir until set.

EVAPORATING OR COLD LOTION FOR SPRAINS AND STRAINS.

1. Chloride of ammonium - - - - - - - - 1 pound.
   Acetic acid - - - - - - - - - - ½ pint.
   Methylated spirit - - - - - - - - - ¾ „
   Water - - - - - - - - - - - 2 gallons.

To be constantly applied on linen bandages.

2. Menthol crystals - - - - - - - - - ½ ounce.
   Methylated spirit - - - - - - - - - 10 ounces.

To be mopped on and allowed to dry before bandaging.

CATTLE MEDICINES.

Alterative Powder (for getting show beasts into coat).

Antimonious sulphide - - - - - - - - 1 part.
Nitrate of potash - - - - - - - - - 1 „
Flowers of sulphur - - - - - - - - - 2 parts.
Aniseed - - - - - - - - - - - 1 part.

Mix. Dose, half to one ounce.

Anti-Milk Fever Drench.

Chinosol - - - - - - - - - - - 1 drachm.
Ginger - - - - - - - - - - - - ½ ounce.
Sulphate of magnesia - - - - - - - - 10 ounces.

To be given in a quart of warm water at calving time.

Chill Drench.

Capsicum in powder - - - - - - - - 30 grains.
Camphor powdered - - - - - - - - - 1 drachm.
Aniseed - - - - - - - - - - - 2 drachms.
Ginger - - - - - - - - - - - - 4 „
Mustard - - - - - - - - - - - - 1 ounce.
Nitre - - - - - - - - - - - - 1 „
Flour - - - - - - - - - - - - 4 drachms.
Beer - - - - - - - - - - - - 1 quart.

Mix for one dose.

Cleansing Drench.

Aloes - - - - - - - - - - - - 1 ounce.
Ginger - - - - - - - - - - - - 1 „
Bole - - - - - - - - - - - - ½ „
Epsom salts - - - - - - - - - - - 12 ounces.

To be given in three pints of warm water soon after calving.

A Milder Cleansing Drench.

Ergot of rye in powder - - - - - - - - 2 drachms
Aloes - - - - - - - - - - - - 1½ „
Nitre - - - - - - - - - - - - 1 ounce.
Ginger - - - - - - - - - - - - 1 „
Epsom salts - - - - - - - - - - - 14 ounces.

To be given in three pints of thin gruel or warm ale.

Bay laurel berries powdered	1 ounce.
Myrrh in powder	½ „
Nitrate of potash	1½ ounces.
Sulphate of magnesia	12 „

Mix. To be given in a quart of warm water.

Drench for Colds and Coughs.

Spirit of peppermint	1 drachm.
Oil of mint	10 drops.
Oil of eucalyptus	60 „
Aromatic spirit of ammonia	1 fl. ounce.
Chlorodyne	4 drachms.

Mix. For two doses, to be given in gruel at intervals of twelve hours.

Cough or Fellon Drink.

Camphor	1 drachm.
Laudanum	1 „
Emetic tartar	1 „
Cummin	1 ounce.
Aniseed	1 „

Mix. For one dose, to be given each night in a quart of gruel.

Husk, Hask, or Hoose Drench.

Oil of turpentine	4 drachms.
Tincture of asafœtida	2 „
Linseed oil	4 ounces.

Mix. This dose is for a yearling; rather less than half should be given to lambs.

Intra-tracheal Injection for Husk.

Chloroform	30 drops.
Carbolic acid	20 „
Spirit of turpentine	90 „

Dose for a yearling; rather less than half for a lamb

Lotion for Mange and Lice in Cattle.

1. Paraffin | 1 part.
   Linseed oil | 5 parts.
   Mix, and apply with a brush

2. Cresol | 4 parts.
   Water | 100 „
   (Must not be used for cats.)

3. Phenol | 1 part.
   Water | 40 parts.
   (Must not be used for cats.)

4. Mercuric chloride | 1 drachm.
   Tobacco juice | 1 gallon.
   (Must not be used for cats.)

5. Stavesacre seeds - - - - - - - - - - 1 pound.
   Water - - - - - - - - - - - 2 gallons.
   Boil down to 1 gallon.
   This is specially suited to pigs and young stock, and is safe for dogs and cats.

6. Sulphurated potash - - - - - - - - 1 ounce.
   Glycerine - - - - - - - - - - 4 ounces.
   Water - - - - - - - - - - - 46 „
   Safe for all animals.

Ringworm Ointment for Cattle.

1. Sulphur - - - - - - - - - - - 1 part.
   Salt of tartar - - - - - - - - - - 1 „
   Oil of tar - - - - - - - - - - 1 „
   Lard - - - - - - - - - - - 15 parts.
   Mix. Apply once a week.

2. Sulphate of iron in fine powder - - - - - 1 ounce.
   Sulphur - - - - - - - - - - - 1 „
   Lard - - - - - - - - - - - 10 ounces.
   Mix.

3 Creosote - - - - - - - - - - 1 part.
   Olive or linseed oil - - - - - - - - - 7 parts.

SHEEP MEDICINES.

Heaving or Straining Drench.

   Sweet spirit of nitre - - - - - - - - 2 drachms.
   Laudanum - - - - - - - - - - 2–4 „
   Gruel or milk - - - - - - - - - - ¼ pint.
   Mix. For various drenches, *see* Cattle Medicines, proportioning the dose to sheep.

Fluke or Rot Mixture.

   Oil of turpentine - - - - - - - - - 2 drachms.
   Skimmed milk - - - - - - - - - - 2 fl. ounces
   This dose to be given three times in a fortnight, and each day in the trough a powder as follows :—
   Sulphate of iron - - - - - - - - - ½ drachm
   Table salt - - - - - - - - - - 1 „
   Gentian - - - - - - - - - - - 1 „
   Mix. For one dose.

Foot Rot and Thrush Lotions.

1. Spirit of Turpentine - - - - - - - - 1 fl. ounce.
   Creosote - - - - - - - - - - 1 „
   Tincture of Myrrh - - - - - - - - - 1 „
   Tincture of Aloes - - - - - - - - - 1 „
   Petrol - - - - - - - - - - - 1 fl. ounce.
   Mix. Shake each time of using.

2. Verdigris - - - - - - - - - - 3 ounces
Sulphate of iron - - - - - - - - - 6 „
Sulphate of zinc - - - - - - - - - 6 „
Vinegar - - - - - - - - - - 1 pint
Water - - - - - - - - - - 1 „
Mix.

3. Butyr of antimony } - - - - - - - - equal parts.
Glycerine }

Foot Rot Powder.

Burnt alum - - - - - - - - - - 6 ounces.
Verdigris - - - - - - - - - - 3 „
Blue vitriol - - - - - - - - - - 2 „
Green vitriol - - - - - - - - - - 2 „
Sublimate - - - - - - - - - - ½ „

To be finely powdered and intimately mixed, for dusting into the crevices after paring away the decayed portions.

Liniment or Paste for Thrush and Foot Rot.

Exsiccated alum - - - - - - - - - 1 ounce.
„ sulphate of iron - - - - - - - - 1 „
Sulphate of copper, finely powdered - - - - - 1 „
Run honey - - - - - - enough to make a stiff paste.

Mange and Lice Applications same as for Cattle.
Dips are used for Scab, which is the same as mange in other animals.

Sheep Dip.

Arsenious anhydride - - - - - - - - 6 ounces.
Exsiccated sodium carbonate - - - - - - - 6 „
Sulphur - - - - - - - - - - 4 „
Soft soap - - - - - - - - - - 6 „
Water sufficient.

First mix the dry powders; then boil them with enough water to dissolve the arsenic, and, lastly, add enough water to make the whole quantity up to sixteen gallons. *See* Scab.

Oils for Straining or Heaving.

Pure carbolic acid - - - - - - - - - 1 part.
Olive oil - - - - - - - - - - 12–15 „
Some shepherds use this as strong as one part of acid to eight of oil.

Oils for the Fly (Maggots in Sheep's Fleece).

Carbolic acid - - - - - - - - - - ½ ounce.
Oil of eucalyptus - - - - - - - - - 2 drachms.
Olive oil - - - - - - - - - - 7½ ounces.
Mix.

Fly Powders.

(For preventing the fly striking.)

Sublimed sulphur	2½ pounds.
Red oxide of lead	½ „
White lead	1½ „
Brown umber	2 „
Black hellebore	½ pound.
Oil of tar	2 ounces.
Animal oil	1½ „

Mix. Part the fleece when wet with dew or from a watering pot with fine rose and sprinkle from a flour dredger.

MEDICINES FOR PIGS.

Aperient Powder.

Jalap	1 part.
Sulphur	1 „
Liquorice Powder	1 „

Mix. One to four teaspoonfuls.

Condition Powder.

Bicarbonate of potash	1 part.
Flowers of sulphur	3 parts.
Nitre	1 part.
Liquorice Powder	4 parts.
Black antimony	1 part.
Fenugreek	12 parts.

Mix. One to four teaspoonfuls in the food daily.

Eczema Powder.

(For various eruptions of the Skin.)

Cream of tartar	1 ounce.
Sulphur	4 ounces.
Antimonious sulphide	½ ounce.
Lentil flour	6 ounces.

Mix. One to four teaspoonfuls daily in the food.

Anti-Rheumatic and Joint-Ill Powders.

Salicine	1 part
Bicarbonate of soda	1 „
Fenugreek	1 „

Dose, ten to sixty grains.

General medicines. *See* recipes for cattle and sheep.

Skin medicines. *See* those prescribed for cattle and for sheep.

Care must be exercised in the selection of skin remedies for the destruction of parasites, as many substances quite suitable for cattle and for dogs are capable of being absorbed by swine and by cats.

Mercurial ointments used for sheep may only be smeared over small surfaces in the case of swine. The coal tar preparations such as carbolic acid, phenyl, creosote, creolin, etc., are not very safe for mange, the following being a dressing preferred for

Mange, Lice, &c.

Camphor, finely powdered	2 drachms.
Linseed oil	15 ounces.
Flowers of sulphur	4 „

Dissolve the camphor in the oil and afterwards mix the sulphur. Shake well at the time of using.

Black sulphur is often advised for pigs, but has no special recommendation; it is merely the outside layer when sulphur is sublimed, or else coloured by the druggist with charcoal.

Ointment for Sore Ears and Tails.

Calamine powder	1 drachm.
Boric acid powder	1 „
Olive oil	1 „
Lard	5 ounces.

Mix. Apply daily.

Ointment for Bad Udders.

Acid carbolic	40 drops.
Spermaceti ointment	4 ounces.

Mix. To be applied with friction.

Ointment for Udder Tumours.

(Actinomycosis.)

Iodine	1 drachm.
Iodine of potassium	1½ drachms.
Lard	1 ounce.

Mix. Apply daily.

See Actinomycosis.

Worm Medicines.

Santonine, turpentine, and sulphate of iron are given for the round worms and areca nut, oil of male fern and turpentine for tape worms. (*See* Table of Doses.)

DOG MEDICINES.

Aperient Pills.

Mercurial pill	3 grains.
Compound extract of colocynth	5 „
Acetic extract of colchicum	½ grain.
Extract belladonna	¼ „

Mix. For one pill.

Alterative Pill.

Grey powder	3 grains.
Extract of rhubarb	3 „
Dovers powder	2 „
Aloes	½ grain.

Mix. For one pill.

Astringent or Diarrhœa Pill.

Powdered opium	¼ grain.
Catechu	5 grains.
Ginger	3 „

Mix. For one pill.

Cough Pill.

Gum Ammoniacum	2 grains.
Camphor	½ grain.
Compound Ipecac powder	1 „
Powdered squill	2 grains.

Mix. For one pill.

Distemper Pills.

1. Compound Ipecac powder — 2 grains.
   James' powder — 2 „
   Quinine — 1 grain.

Mix. For one pill. One every night.

2. Yellow sulphide of mercury — ½ grain.
   Gum asafœtida — 2 grains.
   Jalap — 5 „

Mix. For one pill. One pill every third night.

3. Salicine — 5 grains.
   Bicarbonate of soda — 5 „

Mix. For one pill. (Useful in the rheumatic and paralytic form.)

4. Iodide of potassium — 2 grains.
   Excipient — enough to make a pill.

One daily.

5. Chinosol — 1 grain.
   Quinine — 1 „

Mix. For one pill. One twice daily when the gums and breath are foul.

6. Permanganate of potash — ½ grain.
   Bismuth carbonate — 5 grains.
   Opium — ¼ grain.

Mix. For one pill. To be given night and morning in the dysenteric form.

Tonic Pills.

Carbonate of iron	1 grain.
Quinine	1 „
Extract of gentian	1 „

Mix. For one pill. One daily.

Worm Pills.

Santonine	3 to 10 grains.
Areca nut	10 to 60 „
Treacle	enough to make a bolus.

To be given on an empty stomach.

2. For round worms in young puppies where tapeworms are not suspected, santonine in two grains and upwards, with five to twenty grains of jalap may be given, or

3. Spirit of turpentine	10 to 30 drops.
Castor oil	2 to 8 drachms.

A General Vermifuge.

4. Extract of male fern	15 drops.
Spirit of turpentine	15 drops.
Kamala	15 grains.
Areca nut	15 „

Mix. This is a dose for a twenty-pound terrier, and may be increased to double for a retriever or greyhound, or treble for mastiff or great dane.

A couple of hours after the dose No. 4, an injection *per rectum* may be given containing the same quantities of the liquid drugs mixed with two to eight drachms of hot castor oil, thinned with heated cow's milk. If this is injected and the tail held down for a few minutes, the worms will almost surely be killed, although other remedies have repeatedly failed.

Cats.

Reliance should be placed on santonine for round worms and areca nut for tape worms, or kamala; but turpentine or male fern is not recommended for amateur dosing

Dog Powders.

Many people prefer to give powders, and it will be found quite as convenient to the dispenser to make up the formulæ given for pills on a previous page.

Liniments and lotions recommended for horses and cattle are for the most part suitable for dogs, but it has always to be remembered that dogs will lick off poisons, and these should not be applied in sufficient quantity to be dangerous, or the animal should be rubbed with a soft dry towel after powerful remedies have been applied.

Mange Ointment.

Oil of tar	1 part.
Flowers of sulphur	1 „
Lard	6 parts.

Mix. Apply daily.

Mange Lotion.

Spirit of tar	1 part.
Spirit of turpentine	1 „
Olive oil	1 „

Mix. Apply at intervals of four to five days. Wash between.

Mange Dressing for Pet Dogs.

Sulphurated potash	½ ounce.
Glycerine	1 „
Water to	1 pint.

Apply alternate days.

Lotion for Red Mange (Chronic Eczema).

Oxide of zinc	1 drachm.
Milk of sulphur	1 „
Glycerine	1 ounce.
Almond oil	3 ounces.

Mix. Shake and apply daily, giving alterative powders containing one grain of carbonate of iron or more, according to size of dog.

MEDICINES FOR CATS.

The same remedies (proportioned to weight) as are used for dogs, with the exception that no carbolic acid or coal tar derivatives are safe to employ, and nausea must not be established.

Canker Mixture for Pigeons

Burnt alum	1 part.
Strained honey	1½ parts.

Mix. Apply daily.

FOWLS.

Catarrh or Common Cold Powder.

Sulphate of iron	2 drachms.
Salicylate of soda	1 drachm.
Ginger	3 drachms.
Gentian	3 „
Hyposulphite of soda	1½ „

Mix. Dose, 3 to 10 grains.

Roup or Infectious Catarrh Pills.

1.

Paraffin	60 drops.
Quinine	1 drachm.
Extract of gentian	1 „

Mix. Dose, 5 to 15 grains.

2.

Chinosol	1 drachm.
Sulphate of iron	20 grains.
Extract of chamomile	1 drachm.

Mix. Dose, 3 to 8 grains.

Roup Powder.

Gum asafœtida	½ ounce.
Sweet pepper	2 drachms.
Carbonate of iron	2 „
Grains of paradise	1 drachm.
Dried glaubers salt	2 drachms.

Mix. Dose, 10 to 20 grains.

Mixture for Roup.

Paraffin	1 part.
Mucilage of tragacanth	3 parts.

Mix. Dose, one to two teaspoonfuls.

Lotion for Roup.

Chinosol	1 part.
Glycerine	3 parts.
Water	60 „

Inject the nostrils with a fine-pointed metal syringe, and wash the corners of the mouth daily.

See Tincture of Iodine and how to make it, chapter on Medicines.

Scours or Diarrhœa Pill.

Opium	3 grains.
Catechu	3 „
Extract of lettuce	1 grain.
Bismuth carbonate	1 „

Mix. For one pill.

Gape Pills.

Camphor	1 drachm.
Extract of gentian	1 „
Terebene	1 „
Garlic	2 drachms
Flour	sufficient to make a mass

Mix. Dose, 5 to 10 grains.

Liver Pill.

Calomel	½ grain.
Extract of liquorice	3 grains.

Mix. For one pill.

Mixture for Pip.

Chlorate of potash	30 grains.
Glycerine	2 drachms
Water to	1 ounce.

Dose, one teaspoonful.

Pills for Infectious Sore Throat (Diphtheria so-called).

Chinosol	40 grains
Sulphur	60 „
Tar	60 „

Mix. Dose, 5 to 15 grains.

Purging Pills.

Dried sulphate of magnesia	1 part.
Jalap	1 „
Extract of rhubarb	1 „

Mix. Dose, 5 to 20 grains.

Tonic Pills.

Gentian powder Ginger Extract of chamomile Peruvian bark	equal parts.

Dose, 10 to 20 grains.

Worm Pills.

Santonine	1 drachm.
Areca nut, powdered	1½ ounces.
Turpentine	1 drachm.
Honey	enough to make into a mass.

Dose, two grains for each estimated pound weight of the bird.

Pip and Vent Swelling Paint.

Glycerine of alum	1 part.
Glycerine of tannic acid	1 „
Extract of witch hazel	1 „

Mix. Apply daily.

TABLE OF DOSES.

The articles enumerated below are those mentioned in the body of the work.

The quantity required for an adult ox may be roughly estimated as one-third more than that prescribed for the horse.

Medicine.	Horse.	Sheep.	Pig.	Dog.
Aloes	2–8 drs.	1–2 drs.	10–120 grs.	5–60 grs.
Alum	2–4 drs.	½–1½ drs.	20–60 grs.	10–20 grs.
Aniseed	½–1½ oz.	1–2 drs.	½–2 drs.	15–30 grs.
Antimony (black)	1–3 drs.	10–30 grs.	7–20 grs.	3–10 grs.
Antimony Tartarised (Emetre tartar)	½–2 drs.	10–30 grs.	4–12 grs.	2–6 grs.
Areca nut	1–4 oz.	1–4 drs.	20 grs. to ½ oz.	2 grains to each lb. weight of animal.
Arsenic	3–10 grs.	1 to 2 grs.	—	1/6 gr.–½ gr.
Acetate of Ammonia (liquid)	1–4 oz.	2–8 drs.	1–6 drs.	—
Asafœtida	1–4 drs.	½–2 drs.	10–60 grs.	3–20 grs.
Bals. Copaiba	2–8 drs.	10–60 drops	10–100 drops	5–40 drops
Belladonna Extract	1–2 drs.	5–10 grs.	2–6 grs.	1–5 grs.
Bicarbonate of Soda	2–8 drs.	½–2 drs.	20–100 grs.	5–40 grs.
Bicarbonate of Potash	2–8 drs.	½–2 drs.	20–100 grs.	5–40 grs.
Biniodide of Mercury	5–10 grs.	—	¼–3 grs.	—
Boracic Acid	1–3 drs.	10–30 grs.	5–20 grs.	3–10 grs.
Bromide of Ammonium	1–4 drs.	10–40 grs.	5–30 grs.	3–20 grs.
Bromide of Potassium	1–8 drs.	10–100 grs.	10–60 grs.	3–20 grs.
Carbonate of Ammonia	1–4 drs.	10–30 grs.	5–20 grs.	1–10 grs.
Carbonate Magnesia	1–2 oz.	½–2 drs.	20–60 grs.	5–20 grs.
Cascara Sagrada Extract	—	—	1–4 drs.	½–2 drs.
Castor Oil	½–1½ pints	1–6 oz.	1–4 oz.	¼–2 oz.
Calumba Powder	2–6 drs.	20–60 grs.	15–60 grs.	10–20 grs.
Calomel	15–100 grs.	3–15 grs.	2–8 grs.	½–4 grs.
Caraway	2–12 drs.	½–2 drs.	20–80 grs.	—
Camphor	1–3 drs.	3–30 grs.	5–20 grs.	1–8 grs.
Carbolic Acid	20–100 drops	5–30 drops	5–15 drops	—
Cayenne Pepper	1–4 drs.	½–2 drs.	5–20 grs.	—
Chinosol	20–80 grs.	8–20 grs.	5–15 grs.	2–8 grs.
Chloral hydrate	2–8 drs.	½–1½ drs.	15–60 grs.	3–20 grs.

TABLE OF DOSES—*continued.*

Medicine.	Horse.	Sheep.	Pig.	Dog.
Chloroform	1–3 drs.	10–30 drops	5–15 drops	3–10 drops
Chlorodyne (compound tincture of Chloroform and Morphine)	2–8 drs.	10–60 drops	10–30 drops	3–15 drops
Chlorate of Potash	1–4 drs.	10–30 grs.	10–30 grs.	3–10 grs.
Cocaine	2–10 grs.	1–3 grs.	½–2 grs.	½–1 gr.
Colchicum Wine	2–4 drs.	—	10–40 drops	2–10 drops
Cream of Tartar	1–3 oz.	1–4 drs.	½–2 drs.	5–40 grs.
Creasote	20–60 drops	10–30 drops	1–7 drops	1–5 drops
Easton's Syrup	½–2 oz.	1–3 drs.	10–60 drops	10–100 drops
Eucalyptus Oil	½–1 dr.	10–20 drops	8–12 drops	1–5 drops
Friar's Balsam	1–4 drs.	10–60 grs.	10–40 drops	5–15 drops
Gallic Acid	1–3 drs.	20–60 grs.	10–60 grs.	5–20 grs.
Gentian powdered	2–8 drs.	½–2 drs.	15–60 grs.	5–20 grs.
Gentian, Extract	20–80 grs.	7–20 grs.	2–12 grs.	1–10 grs.
Ginger, powdered	2–8 drs.	½–2 drs.	15–60 grs.	5–20 grs.
Glycerine	2–5 oz.	3–8 drs.	2–8 drs.	1–3 drs.
Glauber Salts (Sulphate of Soda)	4–16 oz.	1–8 drs.	1–2 drs.	10–40 grs.
Hoposulphate of Soda	½–4 oz.	1–4 drs.	½–2 drs.	10–40 grs.
Ipecacuanha, powered	10–40 grs.	5–15 grs.	3–8 grs.	1–6 grs.
Iodine	10–60 grs.	3–10 grs.	1–8 grs.	½–3 grs.
Iodide of Potassium	1–6 drs.	20–60 grs.	10–60 grs.	½–7 grs.
Iodoform	1–2 drs.	10–30 grs.	10–20 grs.	5–10 grs.
Jalap	—	—	1–3 drs.	10–40 grs.
Lard	10–20 oz.	3–8 oz.	3–12 ozs.	—
Laudanum (Tincture of Opium)	½–4 oz.	1–4 drs.	½–2 drs.	10–30 drops.
Linseed Oil	½–1½ pints	3–10 oz.	2–6 ozs.	—
Male Fern Extract	½–1 oz.	½–2 drs.	½–1 dr.	5–20 drops
Magnesia Fluid	—	—	2 drs. to 2 ozs.	1 dr. to 1 oz.
Mustard	½–2 oz.	1–2 drs.	½–1 dr.	—
Nitrate of Potash (Nitre, Saltpetre)	Febrifuge 1–4 drs.	10–30 grs.	5–20 grs.	2–10 grs.
	Diuretic 2–8 drs.	40–60 grs.	10–40 grs.	4–20 grs.
Nut Galls	1–4 drs.	10–30 grs.	10–30 grs.	3–15 grs.
Nitro-hydrochloric Acid, dilute	2–8 drs.	½–2 drs.	½–2 drs.	5–30 drops
Nux Vomica, powdered	20–60 grs.	3–12 grs.	2–10 grs.	½–2 grs.
Oak Bark, powdered	½–1 oz.	½–2 drs.	10–60 grs.	5–20 grs.
Opium, powdered	1–3 drs.	5–30 grs.	5–20 grs.	1–6 grs.
Pennyroyal Oil	1–2 drs.	10–30 drops	10–30 drops	2–8 drops
Permanganate Potash	10–60 grs.	5–15 grs.	5–15 grs.	1–7 grs.
Pimento, powdered (sweet pepper)	2–6 drs	½–2 drs.	15–40 grs.	5–20 grs.
Pepper (Black)	1–3 drs.	15–30 grs.	5–20 grs.	3–10 grs.
Pepper (White)	1–3 drs.	15–30 grs.	5–20 grs.	3–10 grs.
Quassia, powdered	3–6 drs.	1–2 drs.	20–40 grs.	5–20 grs.
Quinine	½–3 drs.	5–20 grs.	3–10 grs.	1–10 grs
Resin	2–8 drs.	½–2 drs.	20–60 grs.	5–25 grs.
Salicine	20–60 grs.	5–8 grs.	5–8 grs.	2–10 grs.
Salicylate of Sodium	2–6 drs.	20–50 grs.	15–60 grs.	3–20 grs.
Salicylic Acid	30–60 grs.	5–8 grs.	5–8 grs.	2–10 grs.
Santonine	20–60 grs.	5–20 grs.	4–20 grs.	3 –10 grs.
Salt (Table Salt)	1–3 oz.	1–6 drs.	—	—
Salts (Epsom Salts)	4–12 oz.	1–4 oz.	½–4 oz.	1–4 drs.
Stockholm Tar	1–8 drs.	20–60 grs.	5–20 grs.	2–10 grs.
Strophanthus Tincture	½–2 drs.	5–15 drops	5–15 drops	3–12 drops
Syrup of the Phosphates	1–2 oz.	1–2 drs.	½–2 drs.	14–40 drops

TABLE OF DOSES—*continued.*

Medicine.	Horse.	Sheep.	Pig.	Dog.
Spirit of Nitre	½–3 oz.	1–4 drs.	½–3 drs.	10–20 drops
Spirit of Ammonia (sal volatile)	½–2 oz.	1–3 drs.	½–2 drs.	10–40 drops
Sulphur (flowers)	½–4 oz.	1–4 drs.	½–4 drs.	10–60 grs.
Sulphuric Acid, dilute	1–3 drs.	10–30 drops	5–20 drops	2–10 drops
Sulphate of Copper	½–2 drs.	10–20 grs.	5–10 grs.	½–2 grs.
Sulphate of Zinc	½–2 drs.	5–15 grs.	3–10 grs.	½–2 grs.
Sugar of Lead	½–2 drs.	5–20 grs.	3–12 grs.	½–2 grs.
Sulphur Iodide	½–2 drs.	5–15 grs.	2–8 grs.	½–3 grs.
Strychnia	1–2 grs.	⅕–½ gr.	$\frac{1}{10}$–¼ gr.	$\frac{2}{10}$–$\frac{1}{10}$ gr.
Syrup of Buckthorn	—	—	—	½–2 ozs.
Syrup of Squills	1–2 oz.	1–3 drs.	½–2 drs.	10–60 drops
Tannic Acid	30–100 grs.	10–30 grs.	5–20 grs.	2–10 grs.
Tincture of Aconite, B.P.	10–30 drops	2–8 drops	2–6 drops	½–2 drops
Tincture of Arnica	½–1½ oz.	30–90 drops	20–40 drops	5–15 drops
Tincture of Ginger (Essence of Ginger)	2–12 drs.	1–4 drs.	½–2 drs.	10–20 drops
Tincture of Iron	½–4 drs.	10–60 drops	5–20 drops	2–10 drops
Turpentine	½–3 oz.	1–4 drs.	20–60 drops	10–40 drops
Thymol	10–30 grs.	—	—	—
Treacle	1–2 lbs.	4–10 oz.	4–12 oz.	—
Tincture of Cardamous Compound	½–2 oz.	1–4 drs.	½–4 drs.	10–40 drops
Tincture of Digitalis	1–3 drs.	10–30 drops	5–30 drops	3–15 drops
Tincture of Gentian	½–2 oz.	1–4 drs.	1–4 drs.	10–40 drops
Vinegar	1–2 oz.	1–2 drs.	—	—

Chapter XXVI.

NURSING, AND FOODS FOR THE SICK.

The first essential of a good nurse is sympathy. Some men, and, alas, some women, are born without the gift of imagination which enables the healthy to feel for the sick; to take their condition into account, and, in a word, *feel as* they do. No training can impart it to some persons, for good nurses, like poets, are "born and not made." If animals do not irritate us with their petulance when sick, or, like children, demand something as unattainable as the "middle brick of the chimney," they are at the disadvantage of being unable to formulate their complaints, or tell the doctor how the nurse has swallowed the stimulants provided for the patient.

One of the things that men accustomed to the care of animals are apt to forget is the importance of securing sleep for a sick one. A healthy horse, cow, or dog will soon accustom itself to all sorts of noises, but there are irritable temperaments among animals, as among men, to whom sleep is impossible when ill, if in constant fear of interruption.

If the owner does not think himself competent to treat the malady, he should call in a veterinary surgeon, and then abide by his instructions. These will include, or at least imply, peace and quiet, as far as it is obtainable. In the town stable it often is not, and I have no hesitation in saying that I have seen scores of horses die in bale stables where chain leads were used and men constantly passing, which would have recovered under other circumstances. Provision should be made in every stable and on every farm,

where numbers are kept, for a sick box or hospital shed, however rough, to cope with an outbreak of infectious disease. A distant hovel, into which the first suspicious case of illness can be removed, may prove in the end to have been worth hundreds of pounds. The sick box should be a sound building capable of the most thorough disinfection, but, failing this, a hovel of some sort can be erected for a mere trifle, and subsequently destroyed. Warmth is too often secured at the expense of fresh air, and if we have to choose between them, let us have the air, as body warmth is not taken in but given out, and we can conserve it by clothing while giving our patients the benefit of pure air—a luxury which in itself is often all the treatment needed beyond a suitable diet.

In emphasising this matter of fresh air the writer sympathises with the up-to-date man who reads with impatience what everyone ought to know, but there are a great many owners and stockmen who are still wrapped in the prejudices of their grandmothers, and would rather make nettle broth and pour vast quantities of medicine down animals' throats than allow them the needful air to revivify the blood and keep down the disease germs which are plentiful in the dark box assigned to the parturient cow whose predecessors have saturated an earthen floor which is never removed. Ventilation is best secured at the top, as the expired air is warmer than that of the atmosphere, and rises. If a current can be obtained at a point low down, so much the better, but pure air may be bought at too high a price, such as a direct draught upon a patient.

The very ill are often more comfortable in a low medium of light than in a bright one, but convalescents make better progress in a well-lit and cheerful apartment, in a view of other animals.

Where more than one sick box is erected, the division between should extend to the roof; otherwise there is no possibility of isolation for an infectious case. After each patient, the apartment should be lime washed, for, in our present state of ignorance (I had almost said "knowledge"), we are not able to discriminate between infectious and non-infectious diseases, and what we think an ordinary cold may be a mild attack of influenza, capable of becoming virulent in its passage through the next victim. Walls and mangers should be scraped before the lime is applied. Earthen floors should be removed to a depth of four or five inches. Broken bricks or stones, if not made good, should be taken up and lime put under them. Defects in floors and walls are best filled with cement and sand mixed. Every bucket or other utensil employed for sick animals should be cleansed and disinfected before using for others (*see* Disinfectants).

With few exceptions, illnesses are accompanied with a rise of temperature, and with it a disposition to constipation; hence we have need of invalid foods of a laxative character. What are these, and how should they be prepared? It may be asked, Why laxative foods, when medicines are so much more active? The answer is that medicines should never be given where diet can effect the object desired, since drugging is but an artificial and temporary means, while dieting is likely to be lasting, and is more consistent with nature's laws. There are several articles of diet which not only act as mechanical looseners of a constipated bowel, but tend to allay inflammation, reduce temperature, and promote the excretion of waste material through the skin and kidneys as well as the alimentary canal, at the same time building up the animal's tissues. Among them may be mentioned the various grasses, cut green, wheat, oats, barley and maize while green, lucerne, carrots, parsnips, mangles, swedes, bran mash, linseed and bran mash, gruel, boiled barley, linseed and hay tea, pearl barley, and apples. These substances pretty well exhaust our available laxative food stuffs

in this country, but in hot climates sugar cane and bamboo cut green are also employed, besides boiled moong, urud and kulthee. Cooked foods either for horses or cattle, given over a long period and to the exclusion of other and unprepared foods, are not desirable.

Very bad cases of indigestion arise among "stodged" dealers' horses, made fat on cooked foods; and cattle whose ration consists for long of cooked potatoes and meals are apt to take on serious digestive maladies. I am not here recommending boiled barley and the like, save as an *invalid* food, when the animal must be tempted with anything it can be induced to eat. Food should be offered to the sick in small quantity and often, and taken away as soon as it is found that the patient will not eat it. To "blow over it," as it is said, is to be disgusted and nauseated against other food. It is therefore most important that a mash or other stuff should not be left, as one constantly finds in all but the best regulated stables and byres. Barley should be cooked in the smallest amount of water necessary, and contain a teaspoonful of salt to the gallon when served to horse or ox. The grasses should not be too much handled, or given too wet, or frosted, and the invalid should have only a few mouthfuls offered at a time. Recovery often dates from the first bite or mouthful of food which a sympathetic nurse induces a sick animal to take. A "fancy" for some particular article of food on the part of an invalid person, if quickly indulged, may prove the turning-point with him. I venture to say that it is the same with animals, although some species are supposed to have so little imagination and scarcely any feeling. I have frequently induced sick horses and other animals to take that first mouthful to oblige me, so to speak, and in response to caresses and soothing words whose tones at least reach their perceptions, for is not there a language—*Esperanto*—universally understood by animals, and spoken all over the world by those who love them?

GRUEL.

The professional attendant on a sick animal will often order gruel, without directions as to making it; the man in charge promises to give it, but there is much uncertainty as to what the invalid will get—some half-cooked stiff stodge on the one hand, or slops on the other. Only in good establishments have I found men capable of making gruel, or a recipe would not be here offered for so simple a food.

A gallon is a useful quantity to make, and if not taken by the sick horse or cow may be utilised in the piggery, if the disease is not of an infectious nature. One pound of oatmeal, barley meal, or flour, will make a gallon of good gruel. The water should be put in the vessel first, or there is a burnt portion at the bottom of the pan which completely spoils all the rest. The meal should then be stirred continuously, until the water boils, after which it can be set aside to simmer on the hob until it is of uniform thickness. It may be remarked here that most animals will eat a thick gruel or mash more readily than a thin or "sloppy" one.

BRAN MASH.

The preparation of a bran mash is an equally uncertain performance by the novice in sick nursing, and it may be well to give suitable proportions. First swill out a bucket with boiling water: mix an ounce of salt with three pounds of bran, and pour on three pints of boiling water: cover over and allow to stand for twenty minutes in warm water or half an hour in cold. This makes a thick mash, but cold water may be added for a horse or cow with a preference for a washier meal. Bran, it should be remembered, holds the heat, and although the top may be cool, when turned out into the manger

the hottest part is uppermost, and an invalid annoyed by finding it too hot at first will very likely be put off his fancy for it altogether. In such little matters does the trained and sympathetic nurse prove his value.

BRAN WET AND DRY.

Bran *wet* is a laxative, bran *dry* may be fed for any length of time without relaxing the bowels. There are a few exceptions to this statement, but it may be taken as a broad rule. Wet bran acts almost entirely as a mechanical laxative, not waiting for digestion, whereas dry bran slowly insalivated and saturated by the digestive juices is a nourishing food. For our present purpose we consider it as a laxative, and in its medicinal aspect rather than for its food value.

LINSEED AND BRAN MASH.

Still more laxative in its character, and having most valuable additional properties in cases of catarrh and lung trouble, as well as in impaction and digestive disturbance, is a combined mash of the linseed and bran. The trouble, however, is to get it eaten. The majority of horses and cattle will eat a plain bran mash when sick, but some few will not; perhaps half the number will altogether refuse linseed. The addition of salt is with most an incentive, and others may be tempted by a little aniseed or cattle spice. There will be a few that cannot be induced to eat a mash of the kind which is so desirable they should take, and it may have to be horned down or given as a drench. If bottled or horned down, it should be made thinner than for eating out of a manger; the neck should be held straight and the head lowered between the gulps to avoid choking, coughing, or spilling. Some horses are subject to vertigo when the head is held up too long, and fall over backwards. Linseed and bran mash should be made by slowly boiling for at least two hours in the proportion of half a pound of linseed to one pound of bran and one ounce of salt in one gallon of water.

LINSEED TEA.

This is a most valuable article of sick diet, and for chronic respiratory troubles, where horses are kept at work, but roar, whistle, or are broken-winded, or troubled with cough. It is the trouble incurred in making which prevents its universal adoption and the great amelioration of broken wind. It practically takes all day to prepare linseed tea to get the most out of it. Half a pound of linseed in a gallon of water put on the hob and allowed to gently boil until the evening, will make a fine demulcent fluid for pouring over the corn and chaff or other food prescribed for the sick or the well, since nothing makes animals sleeker and in better bloom than linseed judiciously fed. Slow boiling gets all the nourishment out of it as no other method can. It is said that the same results are obtained from simply soaking in cold water for twenty-four hours.

HAY TEA.

This is but a simple infusion. The bucket must be clean and sweet, packed with the best hay obtainable, boiling water poured over it until quite full, and then carefully covered to keep in the steam and retain the aroma. It is a refreshing drink for a sick animal, and with some amount of nourishment in it, though not much.

Those sick foods mentioned previously are nourishing to a greater or less extent, but not so well calculated to build up a convalescent as to play the part of laxatives and reducers of temperature. When the crisis of an illness is past it is our chief object to restore the animal to its former condition,

either of working or milking, or growth and development. We may hasten the process by tonic medicines and especially nutrient foods capable of easy digestion and rapid assimilation. Eggs, milk, sugar, malt liquor, wine, malt extracts, ground meals, bread, biscuits, molasses, and the various cereals in general use, crushed, kibbled, or otherwise, made easier of prehension, mastication and solution.

EGGS AND MILK.

It was not until the late Professor Williams called attention to the advantages of eggs and milk for sick horses that anyone seemed to think of animal products for graminivorous animals, but they are, of course, capable of supplying in more concentrated form the building materials required by invalids than any vegetable substances. Eggs by the half dozen may be beaten up with milk by the half gallon or more, at the time, and drenched with a bottle until a taste is acquired for them; many horses take them freely. They may also be boiled hard and chopped up fine with other food, as with bread crumbled, or biscuits, whole or broken, as may be preferred. Bread is not thought of, but most horses take it readily, and if affords nourishment without the effort necessary to get the same value out of corn, whether whole or kibbled. It is also a change from wet food, of which most animals tire all too soon when ill, and cease to care for when well.

STIMULANTS.

With regard to alcholic liquors, there are "conscientious objectors" both among animals and their owners. It is the generally accepted view among veterinarians, however, that, judiciously employed, they tend to conserve energy and excite appetite, and digestion, and enable sick animals to hold out against prostrating diseases. This was noticeable when the worst forms of influenza were rife, and whiskey and quinine were thought to give greater support than any other combination of tonic and stimulant.

The dose for a horse or cow of a fairly good beer or stout, is a quart twice a day: half a bottle of wine at a time (a bottle per diem), and if spirits are given, about a gill, amply diluted in not less than a quart of water.

WATER.

One is inclined to think that water is too cheap, and therefore not sufficiently valued, but the real truth of the matter is that it is heavy to carry, and mangers are not adapted to running off stale water. A sick horse or beast should be frequently offered fresh water. The pail should be scrupulously clean, with no smell of physic on the hands of the person giving it. Icy cold water may be rejected by a very thirsty animal, and warm water is still more objectionable. The chill should be taken off, so that the thermometer would indicate about 80° Fahr. if tested. Most animals will take it at that. There are conditions of health, or states of the internal organs, in which a deep draught of cold water will increase the blood pressure in the parts already congested by causing contraction of the blood-vessels of the bowels.

A very sick animal will feel worried by grooming the skin in the usual way, but a convalescent may be inspirited by the glow produced by whisping. The feverish and prostrate feel refreshed (as judged by their subsequent behaviour) if the eyes and nostrils are sponged with warm water and then with cold; the same attentions being given to horses about the perineum. If we except tetanus and diseases of the eye, there are few convalescents but would thank us if we let in sunshine, and give a view of other creatures more fortunate than themselves.

Chapter XXVII.

METHODS OF CONTROL OR TRAMMELLING ANIMALS.

The great value of domesticated animals has stimulated the inventive faculty of man, and we now have many means of control which can be employed without the special gifts of the trainer or tamer of savage creatures. One has but to glance through a modern illustrated catalogue of veterinary appliances to read the history of the profession's progress in pictorial form.

A coil of rope at one end, and an operating machine at the other, of this chapter may be taken to represent the first and last stages of control for the purposes of surgical operations. The next—if one may venture on the dangerous ground of prophecy—will be in the form of an anæsthetic, which will act with such certainty and safety that hobbles of any kind will be superfluous; meantime, we may call the reader's attention to a simple method of

FIG. 105. ARRANGEMENT OF ROPE FOR CASTING A HORSE.

throwing a horse down with nothing more than an ordinary wagon rope. A loop or collar is made by tying, and passed over the head; the knot being on the withers, the ends are passed between the two hind legs, and brought round the pasterns, in the way which is clearly shown on the horse's left side in the illustration (Fig. 105). Two men on each side and one at the head should be employed, but in case of emergency, one man on each side will succeed, especially with a restive horse, as such a one compasses his own downfall by struggling. Colts are usually cast in this way for castration, and in the writer's experience, no hobbles are so useful as the plain wagon rope for this particular operation. There are a great variety of casting hobbles made, but the principle is pretty much the same—namely, drawing all four feet together by straps, through whose rings a rope is made to run, and fastened off by hitches or by the insertion of a spring hook into the loops of a chain which forms the last few feet of the "rope."

It is often necessary to exercise a modified control over horses without the serious performance of casting, which, however carefully done, is attended with risk, increasing with the age of the subject. The use of mechanical means

* The claim has since been made for a preparation that destroys sensation without influencing consciousness.

is probably familiar to every horseman, and I would here protest against the unnecessary use of the twitch, while acknowledging its utility and importance as a means of controlling horses for such minor operations as lancing an abscess or removing a sitfast. The strip of leather or piece of stout string which is passed through a hole in a stick and tied in a knot, is placed over the horse's upper lip and then wound tightly, so as to compress the plexus of nerves situated within it. Any man who calls himself a horseman should be able to give a ball while a twitch is being got ready. It is as unnecessary in the case of drenching in ninety-nine horses out of a hundred, yet one sees it constantly employed without so much as an effort to administer medicine without it. There are all sorts of appliances for drenching, of which we give a few illustrations, Figs, 99, 102, and 104 being the most useful in the writer's opinion. Strapping up one foot; but this should not be done without knee-caps, or a passionate horse, when suffering from an operation, may throw himself down. In the absence of a special strap, a stirrup leather serves the purpose very well.

The methods described are those in use among veterinary surgeons generally, but Mr. Galvayne has demonstrated with what facility he can throw

FIG. 106. THE HORSE CAST.

a horse single-handed, and with his permission we copy the following from his *Twentieth Century Book of the Horse*, a volume which needs no recommendation:

"I will now describe my ordinary method of throwing a horse, which involves the use of a surcingle and crupper. First put on the head-collar and buckle the nose-band rather tightly, low down, then adjust the surcingle and crupper; next pass a "Galvayne" strap through the side-ring on the surcingle on the off side, (that being the side upon which, in this case, the animal is to come down) and under the arm of the off foreleg; tie with a single bow-slip-knot to the ring at the end of the strap, and slip it round so as to bring the bow on the *inside* of the fore arm and close to the elbow. The object of the strap is to prevent the surcingle from slipping round. This is an important thing, as, should the surcingle slip, it may be difficult to make the horse lie down. Now get the throwing rope (which should be pliable and not too thick), fasten one end of it to the second ring from the front on the top of the surcingle, pass the other end of it through the *near* side cheek ring on the head-collar, from outside to inside, then through the foremost top ring, from front to rear. Tie up the off foreleg in such a manner that the strap will not permit of any play of the knee. This is important,

and the best way to do it is to take a strong strap, about 4 feet in length (a stirrup leather will answer admirably), place the buckle upside down (the tongue being in the lower side, pointing towards the body, and on the inside of the pastern), take two turns round the pastern, then bring the end inside, around the arm to the outside, and through the buckle; pull the foot up as tightly as possible, until the heel touches the elbow. When the animal is down you will find the buckle to be in the handiest place, namely, inside the off arm. Assuming that you have correctly carried out the above preliminaries, your colt or horse will now be in the proper position for throwing. Take the *end* of the halter-shank in your right hand and push the animal's head gently from you as far round towards the near side of the surcingle as you can manage to do with ease, and at the same time take in the 'slack' of the throwing rope; stand back a couple of yards or so, pull the horse's head round towards the surcingle with your left hand steadily and strongly (not sharply, or with jerks), keeping a slight strain on the halter with the right hand, but allow the left hand to pull the head round, and the animal will gradually *lie* down. Should it attempt to rear, which

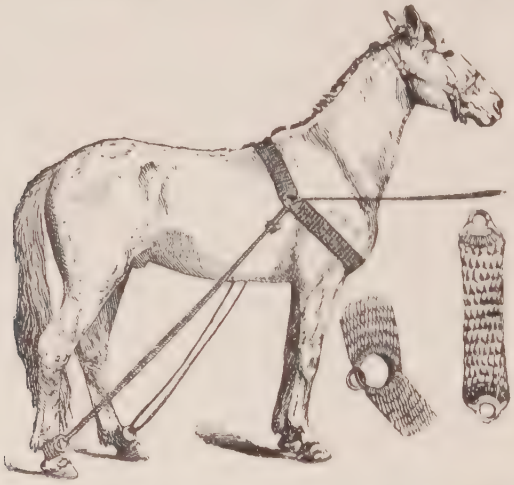


FIG. 107. CASTING HOBBLES. KNOWLES' WEB. (*Huish*).

will very rarely be the case, slacken the throwing rope by a jerk with the left hand and pull on the halter-shank with the right hand. This will quickly right the animal and enable you to proceed with the throwing as instructed. We know some of Mr. Galvayne's pupils who are quite adepts at this plan. If it shows any inclination to struggle after being thrown, just pull its head round toward the surcingle. Repeat this every time it moves, and in a very brief space of time it will lie quite still. Then handle it judiciously all over, including its hind legs; any of its legs can be held in any particular position by means of a short, suitable rope attached to the pastern. If you desire to put the animal fairly on its back, and retain it in that position, roll it over until its legs are perpendicular, and wedge a bag of hay under each side of it; then proceed to tie it as follows: Double a strong rope into two equal lengths, and put the double end round the neck where the collar comes, knotting it at the chest; pass the two ends of the rope round the back fetlocks and taking a twist back again through the neck-piece."

We have spoken of throwing horses down, but we have also to use means to keep them up. There are injuries from which a horse will recover if he

can be upheld by slings, whereas, if allowed to lie down, he would remain, either from inability to rise or fear of pain in doing so; and a horse has only to continue prone to die. Cattle will lie upon the ground for weeks and make a perfect recovery, but horses die from imperfect function.

Slings of a variety of patterns have been invented, one of the best of which is shown in the illustration, but the farmer has sometimes to improvise a sling out of stout corn sacks and poles, with two breechings from cart harnesses to prevent the patient from pitching out either at the back or front. Ropes and pulleys being always at hand, a handy man can suspend a horse until professional assistance and proper slings can be obtained (Fig. 108).

Slings are sometimes used to prevent horses from hurting themselves, and it is quite possible for a broken leg to unite when under such control, but the union is seldom clear of adhesions, occupies a very long time, without the probability of perfect restoration to soundness, without which a horse

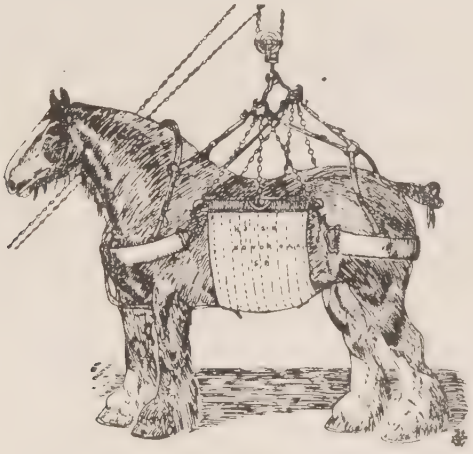


FIG. 108. HORSE IN SLINGS (*Huish*).

is not worth the outlay, save in the case of a valuable brood mare. The restraint of the pillar reins is enough for many horses, but some cannot so sleep, or they drop their heads, and either break the reins or injure their mouths. I have seen many horses with wounds about the face which would have healed satisfactorily but for the friction engendered by the head collar or halter, for, strange to say, not one person in a hundred seems to think that a horse can be fastened to the manger by a strap round his throat in the same way as a dog, although it is not a plan to be recommended in the ordinary way, as the animal, in rising, is more likely to put his leg over the rope. The Cradle is not often enough made use of, to prevent a horse from rubbing his face against a blistered limb, or interfering with a bandage. Home-made ones can be manufactured in half an hour or less with a few faggot-sticks and a ball of string. Bandaging the opposite leg will often save a blistered limb from injury, as well as the sound one from unnecessary pain and temporary injury.

The control of horses, and the appliances for the purpose, are given the first place of importance, both on account of the greater value of these animals as compared with other domesticated creatures, and owing to the superior education they have received, and the better discipline in which they are kept.

Time and space will not permit of an excursion into the interesting region of the relative intelligence of animals, but as regards tractability, or the capacity to receive education, the horse stands before the ox, whom we can never trust unless emasculated. The principle of the bull ring has never been superseded, and one can easily credit Tubal Cain with its invention. We have, however, improved upon the original patterns, and the method of inserting them in Billy's nose. The barbarous practice still lingers in some districts of burning a hole through the cartilage or septum which

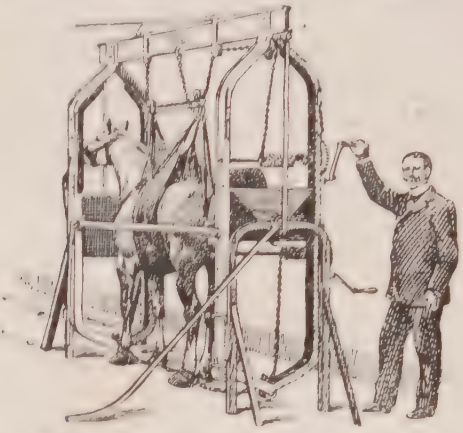


FIG. 109. AN OPERATING MACHINE.

divides the nostrils, but an instrument made for the purpose cuts a clean disc out of it with the minimum of pain. All sorts of fastenings have been devised for bull rings, but in this country a sunk screw is best liked. A favourite pattern on the Continent is fitted with an interlocking hinge opening somewhat after the pattern of a bracelet; a ring or holder is made, to avoid punching a hole through the cartilage. It is weak in principle, as anyone may see, and not more humane if screwed tight enough to be effective. A German instrument for disbudding might be shown, a practice which is lawful

FIG. 110. THE OPERATING MACHINE TURNED HORIZONTALLY.

in Scotland but not in England, where "the mother of invention" has taught us the use of caustic alkalies to disbud or destroy the embryonic horn, in lieu of the more painful operation of removing horns when grown.

Not much in the way of improved appliances for sheep and pigs is to be noted, but I cannot conclude without a word of praise for our American friends, for the invention of a simple implement for pig-ringing which does away with nearly all the pain and seven-eighths of the trouble connected with that necessary method of control.

Chapter XXVIII.

VICES, TRICKS, AND BAD HABITS OF THE HORSE.

Inconvenient behaviour on the part of horses is generally spoken of as "vice," or vices, and without wishing to make anyone "an offender for a word" we prefer to offer the wider choice above, and let the individual reader decide for himself. The dealer with a vicious brute to sell will speak of him merely as "playful," but the dissatisfied buyer will—until he wishes to sell again—describe him as a perfect brute, who would "kick a fly's eye out." In the same way, a rank jibber might be described as a passive resister, with a conscientious objection to a forward movement. It will be sufficient for our present purpose to describe some of these equine disabilities, and offer suggestions as to their prevention, control, or amendment, with illustrations of appliances for their amelioration.

KICKING IN SADDLE AND HARNESS.

Fear or anger may cause a colt to kick when first ridden or driven. The rider should be able to take care of his own skin, and let the colt tire himself, as he soon will, if he is anything of a performer. He will presently find it

FIG. 111. STRAP AND BALL ATTACHMENT FOR A KICKER.

FIG. 112. A HIGH KICKER.

more profitable to exert himself in the direction required by the man on his back. Nor should this man "paste" him with whip and spur, but rather persuade him by kindness, and a commendatory tone, unless he stops short and, of absolute temper, sets about throwing his rider. If the man is confident of his ability to sit him through the combat, he should not hesitate to accept the challenge, but fight it out. Very few colts fail to learn in one such lesson; almost all are conquered at the second one and in much less time, but where the rider is beaten, the colt will take a lot of time to forget his triumph. Only by good horsemanship can a ridden kicker be conquered. In harness we have mechanical contrivances to aid us. In double harness, two powerful straps attached to the sides of the harness pad, and running parallel along the loin and over the quarters, to be attached to the pole bar. This answers fairly well, but, should the traces be long, the kicker obtains some advantage by getting upwards from the pole, and to some extent altering the position of the double straps. These should not be relied on,

without the overhead rein, first adopted in America. Unless a horse is a "cow-kicker," he will endeavour to put his head down before he throws his heels up. The overhead check baulks him of his fancy, and he hurts his mouth and finds it won't do. Kickers in single harness are not necessarily vicious; anyway, they may not have been so at first, but something which led to hitting up behind originally caused the discovery of how much amusement might be had by a good "mill," and, for sheer love of the smashing up

FIG. 113. A KICKER IN HARNESS.

of dash-boards and other breakable parts, a horse will remember, and kick again. I have had many in my time that have lost good situations from having once or twice offended, and though they may have worked for months and years without attempting to kick, the devil has remained in possession waiting an opportunity. This should never be afforded; an animal which has kicked in harness once should never be trusted without a stout

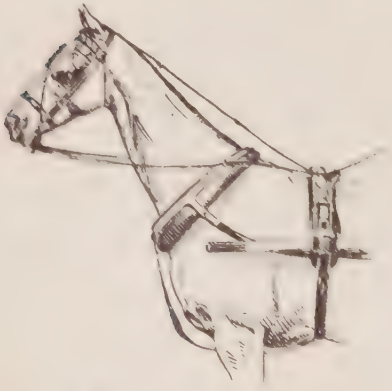


FIG. 114. OVERHEAD REIN.

FIG. 115. KICKING STRAPS.

kicking strap placed well back upon the croup, and, by preference, running through a stout loop made on purpose, not passed through the ordinary crupper. If the tugs are placed far back and they, as well as the strap, are really strong, one may sit over a kicker and give him a good quilting which will last him a very long time. The ordinary kicking strap placed in the usual situation is worse than useless, as it gives a false sense of security, and in the critical moment fails.

COW-KICKING.

By this is meant the lashing out with one leg as some cows will do. In double harness it is liable to result in a broken leg for the yoke mate; in single harness, to serious injury to the kicker's own limb, generally from contact with the edge of the step of a two-wheeled trap, or, if a four-wheeler, the shoe may get fixed in the transom plate or other part of the under carriage. Very low carriages, such as the vis-à-vis or Parisian phaeton loved

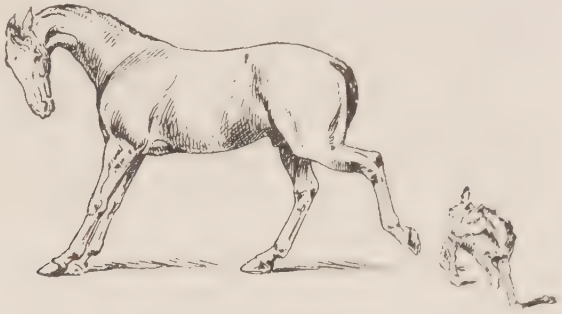


FIG. 116. THE COW KICKER.

of farmers' wives, are the most dangerous of all in which to drive a kicker; he can lift the forecarriage, and kick the low transom all the same for an ordinary strap. It is not so well known as it should be that when a horse unexpectedly sets to kicking in harness, holding up his head will stop him for the time, and until assistance can be obtained.

KICKING IN THE STABLE.

Horses of evil disposition, that will kick like a flash at a passer-by, are extremely dangerous, and should never be placed in a position to injure others. Night kickers are troublesome from the broken rest they cause to others as well as themselves, and the damage to property and to their own limbs. People who own overworked horses dismiss without sympathy the complaints of those who own night knickers, saying that it is idleness only which causes it. Not always is this the cause, or, if the original cause, the effect does not cease with its removal. I have known not a few sorry old jades that have wasted time at night kicking the stall post, which they needed badly for repair of tissues habitually overworked. Ennui may be the cause, but there grows a fascination for it, which becomes an irresistible desire, as long as circumstances permit the indulgence of the vice. The remedy, then, is to spoil the fun, such as it is. Padding the stall posts and divisions so reduce the sound as to make many horses cease to kick the previously familiar object, but those which continue the trick soon destroy any sort of material that may be fixed. A swinging bag of hay or shavings will deter others, at least for a time. If it is so suspended that it comes back upon the kicker, it frightens him by what looks like retaliation, but familiarity breeds contempt, and a fresh object may be chosen for kicking at, as the sides of the stall, which in most instances afford more sport by giving way or going through. If these simple precautions fail, the strap and ball (Fig. 111.) will have to be employed, and will almost certainly prove effectual. There is the objection that the strap may wring the skin, and the ball may bruise the shin, but the kicker soon learns to know this, and avoid it.

RUNNING AWAY.

It is a perfectly natural thing for a horse to run away when frightened. He was designed for flight and not for fight, and has inherited the trick. The bit, like the twitch, restrains him by fear of greater pain, and when it fails it is because the fright makes him temporarily insensitive to the punishment it inflicts. The special bits and contrivances which answer, more or less, in preventing horses from bolting do so by pressure upon a plexus of nerves, as does the twitch in the sensitive and mobile upper lip. When a horse has once bolted, he must be regarded as for the time mad. He cannot gauge his own impetus or measure distances, and if in harness the erratic movements of the carriage spur him on to still wilder efforts to escape from the peril he apprehends. On all future occasions, the suggestion to bolt comes as an irresistible impulse, and must be regarded as a form of insanity. He is never again safe to drive, although behaving with strict propriety for years. Hard-mouthed animals, who prefer to pull a trap with the reins rather than with the traces, are more liable than others to run away. There is no one style of bit that can be recommended for all. Some will be easily restrained with a plain snaffle, while the old port bit with a powerful leverage will answer for others. The most successful of all contrivances for pullers is the nose net, which presses upon the false nostrils, and, by compressing them, presumably induces a feeling of failing wind or breathing power.

BORING.

Boring is generally understood to mean poking the head out, or holding it low down, whereby the driver's power is reduced to a minimum. For such, the bearing rein is indispensable, although not always affording the required power, because a wooden-mouthed animal will lean on it. Persons who have failed with punishing bits will sometimes resort to blistering substances at the corners of the mouth, and for the moment succeed, but the ultimate result is thickening of the skin and diminished sensibility, and the last state of the puller is worse than the first.

SHYING.

These irritating and dangerous habits are often attributed to defective sight, and there can be no doubt that such is sometimes the cause, but many more horses shy that have sound eyes than with imperfect ones. It is a very constant defect of Russian horses and ponies which have run wild in mobs, and, like running away, is the natural method of avoiding the spring of the enemy. It is said with regard to Russian ponies that they acquire it through the danger of falling through ice, over which they have often to travel, and that their fear of manholes on our roads is due to the sound below of running water, which they associate with faults in the ice. Well-bred horses, brought up in a thickly populated country, and with their brains developed, can easily be taught to overcome their fears of manholes and motors and other things which they find do not hurt them, but the mean intelligence of the ponies who seldom see a human being makes it well-nigh impossible to educate them into a disregard of such things as they shy at. Feeding from a nosebag, close to a manhole or roadside object which has caused shying, will sometimes overcome the fear; the animal acquiring a fresh and more agreeable association with the spot. It is often asserted by the purely sentimental that punishment is no good for shying, but every breaker of experience and of patience will remember cases in which every opportunity was given of learning the harmlessness of things at which horses shied, without overcoming the trick, and that a smart cut with the whip and a shout would make the animal at first rush by with a swerve, and presently with a lively remembrance of

what to expect if he shied again. Words of encouragement with each improvement, and a resort to the whip when the lesson is disregarded, will, in my experience, go a long way to curing the habit with any but hopelessly stupid animals. Where defects of vision cause shying there is nothing for it but to cover them with blinkers. These are often made unnecessarily large, and must render work very monotonous.

Before any size or pattern is decided upon, the animal should be tried with black linen or cloth coverings, which will show as much of the road as may be consistent with securing the object. That shying is sometimes due to dentition troubles is likely, and the writer has known the habit to be dropped after the removal of so-called wolf's teeth. Instead of restricting the horse's view by blinkers, the opposite plan of enlarging the field of vision by wholly removing blinkers, sometimes stop the habit of shying. Enquiries among the railway companies and others who have given up the old-fashioned bridle is distinctly in favour of their discontinuance.

JIBBING.

Anything more trying to the patience than a jibber or "baulker," as they say in America, cannot well be. There is not the excuse of fear or ignorance. Those persons who say that shying should never be punished

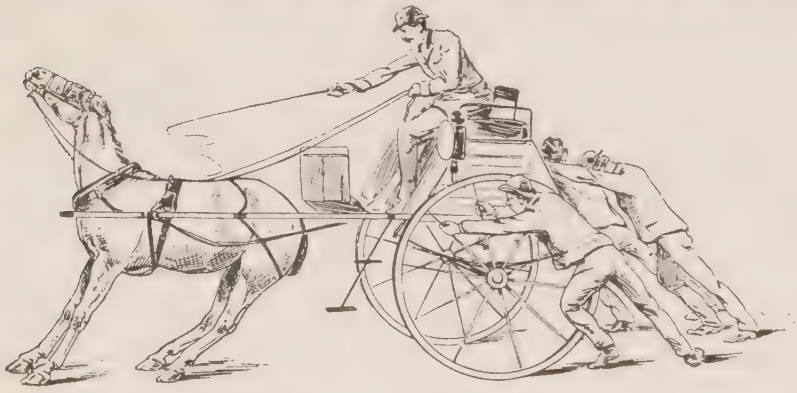


FIG. 117. A BAD JIBBER.

are ready with an excuse for jibbers, to whom they attribute a mental derangement of an intermittent character. The manner of some jibbers might lead the impartial enquirer to believe it, after witnessing a half hour's tussle with a confirmed baulker.

Whatever may be said as to the above theory, it is pretty well agreed amongst experienced horsemen, who are also breakers, that jibbers are not like poets, inasmuch as they are "not born" such, but "made" baulkers. The majority of colts are asked to learn too much in a single lesson, and with a sense of fatigue, or the least difficulty in the collar, naturally pause. This is taken as a signal for the whip, and a colt that is not good tempered refuses to go on. This first failure is indelibly impressed upon the youngster's memory. It has to be unlearned by starting him down hill, and warming him to the collar before he tightens his traces to real pulling. The best of colts have been spoiled by putting to with a collar gall. The breaker has only a certain time to give, or is bound to a price, and he is anxious to get on with the job, or the amateur does not see the wrinkles in the skin, caused by yesterday's work. The animal goes to one side, as if the traces were of unequal length, without the driver understanding that the colt is galled.

Besides these indiscretions, most colts are driven too far and for too long at a time, with the idea of mastering them completely. They are very soft, and much more readily tired than most people suppose, and when feeling so, and put to a sharp hill, refuse, and so become wilful. They will go when they like, which is generally, and stop when they choose, which is not often, if kindly and firmly used. Some of the very best horses the writer has owned were jibbers, but with a little humouring, such as starting with the gradient in their favour, or turning round and getting on the step while in motion, they have proved invaluable servants. There is no specific for jibbing, unless patience and good temper may be so described. What will induce one jibber to go will only confirm the obstinacy of another. One should never try to make a horse that has refused to proceed, continue in the *straight* line, but pull off to one side, and pretend not to have noticed the disobedience. A display of temper is met by temper, and the *suaviter in modo* is worth more than the *fortiter in re*, where most jibbers are concerned. Sometimes a diversion may succeed, as altering the harness, or gathering, a handful of grass, or giving a lump of sugar, while moving on. If once war is declared, it must be fought to a finish, and who shall say, when every effort has been made to secure a *modus vivendi et procedendi*, that we are cruel in resorting to punishments? With the help of a couple of men to turn the wheels of a two-wheeled trap, the stubbornly planted legs may be made to smart with a fine lash or a switch out of the hedge, and if the animal won't go by zigzags he may be turned round by force, and persistently backed in the direction in which the driver desires to go, until the fatigue on one set of muscles makes the recalcitrant one only too glad to proceed head first. There are methods which cannot be recommended and may not be described, but the fact that many jibbers work well for gipsies, as trace horses, up stiff hills, like those leading to Goodwood racecourse, and are useless to other people, is proof enough that fear of punishment will influence the most confirmed in the vice. We know from personal observation the nature of some of these punishments, and they are associated in the minds of the jibbers with a particular word or tone of voice, which is used if the animal hesitates. One of the simpler punishments which has often answered well is to tie up the passive resister in harness, and make him stand night and day, refusing to let him move when he wishes. Why this plan should appeal to his reason, when the nosebag does not, and the application of torture also fails, is not ascertainable. To sit in a trap and whip a baulker is but to court humiliation.

CRIB BITING.

Whether cribbing is first begun, in some cases, from a nervous form of indigestion, is still undecided. That young horses will contract the habit from others is beyond a doubt, and one should therefore decline to put up at a livery stable next to a crib biter. The vice or trick may never get beyond laying hold of the manger, but it usually proceeds to wind sucking; the animal actually swallowing air and becoming distended by it. There is a pig-like grunt accompanying the act. Horses addicted to this habit are subject to flatulent colic, and degeneration of the walls of

FIG. 118. A CRIBBER.

the stomach; they do not take so much sleep or rest as others, and consequently wear out faster, if they do not die of colic or ruptured organs.

Like other tricks and vices it may be checked at first with some prospect of success, but when the wind-sucking stage is arrived at cure is out of the question, prevention or palliation is all that can be hoped for. A loose box with four bare walls and food given on the ground for a time will sometimes enable a young horse to forget the trick, especially if he gets plenty of work; for cribbing is often born of ennui.

A muzzle between meals, or a perforated barrel bit, is apt to be left on when a work-horse might have been feeding to advantage, or left off when a tempting deal manger invies easy destruction. Metal mangers, or coverings of stout tin or hoop iron, merely serve to save them from early disintegration; they do not prevent cribbing. Every nauseous drug, from aloes to asafœtida, has been tried as a smear over all available surfaces, but with only temporary success. When all else fails, the strap, drawn tightly around the throat, must be resorted to, and it is rare indeed that this fails. Its objection is the mark it leaves on the poll or a little further back, advertising the fault, even to those who do not recognise the peculiar wear of the incisor teeth, which should be inspected before purchasing any horse.

FIG. 119. A VARIETY OF MUZZLES

WEAVING.

Weaving, or swinging the head with a rotary motion, is probably picked up as an amusement, to vary the monotony of staring at a blank wall for many hours at a stretch. If the head stall is attached to a chain, it makes a most distracting noise, which the horse appears to enjoy, although he "takes his pleasure sadly" and doesn't look cheerful over it. If provided with a rope lead he will wear it through in no time, so that a chain is a necessity, if he remains in the stall, and there is no means of preventing the noise. Other horses grow accustomed to it, and some will become imitators, so that it is desirable for every reason to provide some sort of a loose box, where indulgence in the habit loses much of its attraction when no sound is being produced.

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